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Contractors and Engineers Monthly

Vol. 45, No. 1

JANUARY, 1948

\$3 a Year, 25 Cents a Copy

Covering the Field

Concrete Paving

Men and machines crowd to completion an 8-mile paving job. See text story on page 1; picture story, pages 56-57.

Fourteen bridges slow a 9-mile concrete-paving project featured on page 82.

Grade Separation

A 5-span concrete structure is being built to carry the south half of relocated U. S. 40 over RR tracks. Page 1.

County Road Work

Radio communication speeds a county's snow fights, which—along with its other activities—are covered on page 2.

Giant Irrigation Project

Structures of the Columbia Basin Project and concrete methods on siphons and canals are described in an article, page 6.

Bituminous Paving

An old macadam highway is widened and surfaced with three courses of plant-mix for 40.2 miles. The story is on page 12.

Piles Driven for River Lock

Submarine-driven timber piles, 72 to 78 feet long, provide a foundation for a new concrete lock. See page 22.

Planning Urban Routes

New York has a special bureau to plan arterial routes through cities; its work is thoroughly outlined on page 27.

Highway Maintenance

Light native soil, a short work season, and a short budget fail to keep a good maintenance district down. Page 33.

Portrait in Print

D. W. Winkelman, AGC President-Elect, sees a big road-building program ahead. Page 39 covers the interview with him.

Grading for Road Relocation

Sharp curves and grades have been eliminated by the 4.5-mile improvement which is the subject of a story on page 41.

Cranes Place Dam Concrete

Concrete placing by cranes at Center Hill Dam is reported on page 44; aggregate production on page 95.

A Good Safety Program

The territory for accident prevention is in the gang, with the men, explains a USBR safety engineer on page 51.

A Contractor's Shop

The shop described on page 58 serves as a repair base during jobs and handles sideline manufacturing between jobs.

Airport Paving

For an account of plant-mix paving of runways and taxiways, as well as novel slope-dressing methods, turn to page 59.

Access Road to Dam

How a crusher set-up and crew speeded the 8-mile access road to Hungry Horse Dam is told on page 65.

Roadside Parks

A state's roadside-rest program is reported on page 76, from legislation through selection, acquisition, and development. (You will find "In This Issue" on page 4)

Paver Crowds Crews On Concrete Highway

Dual-Drum Machine Paces Finishing Equipment and Batch Plant on 8-Mile Two-Lane Paving Job

(Photos on pages 56 and 57)

IN late September, two local residents of the southern-Iowa town of Chariton walked out to the city limits to watch with amazement modern concrete-paving equipment roar to a finish on the first leg of the new two-lane concrete highway on Iowa State Route 14.

With autumn rains not far off, machines and men were working like mad 10 hours a day to crowd the job to completion. Every 42 seconds the big Koehring Twinbatch paver disgorged 34 cubic feet of concrete. Batch trucks flew up in a cloud of dust. Finishing machines hurried to keep pace. The two old men could fairly see this big paving outfit crawl forward, irresistibly.

"Tell yuh what, Hank," said one, "thet's the fastest machinery I ever saw. Used to be they'd pour it a lot slower." "Yeah, but times ain't what they used to be", said Hank. "Them fellers is purty smart. They git that great big mixer there, start it to working, and

everybody else just has to keep up to it!"

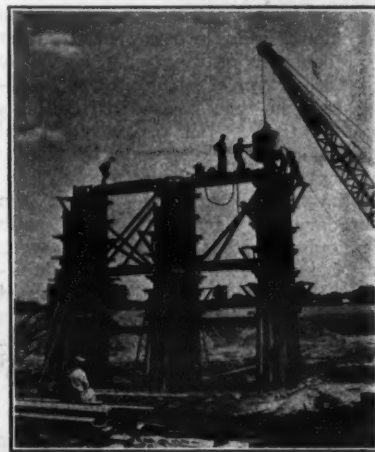
Now there was no way for Hank to know how right he was. As it happens, his observation was most astute. For what he said was happening *did* happen on this stretch of Iowa State Route 14, extending from the city limits of Chariton south 7.774 miles. The C. H. Atkinson Paving Co. of St. Joseph, Mo.—one of the pace-setters of the midwest—unleashed all the power of modern equipment under a \$321,000 contract with the Iowa State Highway Commission.

The job was a Federal-Aid project, designed to make a better north-south state highway out of Route 14. It is a part of Iowa's general policy to get as many of its residents as possible out of the mud and up on paved highways. Route 14 is rapidly becoming such a highway, situated as it is between U. S. 65 and 63.

New Slab Reinforced

The new slab is 22 feet wide, accommodating two lanes of traffic. It has a 2-inch straight crown in the center, sloping away towards drain curbs on the low side of the pavement. Concrete is 10 inches thick at the outside edges, tapering evenly to a thickness of

(Continued on page 99)



C. & E. M. Photo
This front view of the east abutment of the Zimmerly grade-separation structure shows concrete being emptied from a bucket into the upper-lift forms.

Bridge Will Carry Road Over Railroad

Five-Span Structure Built Where Relocated U. S. 40 Will Cross Penn RR Tracks Near Vandalia, Ill.

A GRADE-ELIMINATION bridge is under construction about 3 miles east of Vandalia, Ill., where the Illinois Division of Highways has planned to relocate U. S. 40, major east-west highway crossing the state. Ultimately, a new 4-lane divided highway will replace the present two lanes; this limited-access high-speed road will extend from Terre Haute, Ind., on the east to St. Louis, Mo., on the west.

As it nears Vandalia, the new road will by-pass the town on the north, instead of going straight through it as the present road does. This change will cause the highway to cross the main line of the Pennsylvania Railroad between St. Louis and New York at an angle of 19 degrees 36 minutes, or at a skew angle of 70 degrees 24 minutes.

At this point in Fayette County two bridges will be built. The 5-span structure now under way will carry the southern half of the new dual highway. The bridge for the northern roadway will be contracted for at some future date. Two other important bridges for the new route are under construction in the Vandalia area. North of town, where the Illinois Central railroad will intersect the projected highway, a railroad grade-separation structure is being built. East of Vandalia work on a new highway bridge across the Kaskaskia River is also under way.

The Illinois Division of Highways awarded the construction of the Pennsylvania Railroad grade-separation structure to the Zimmerly Construction Co., of Paris, Ill., on its low bid of \$175,000. Work on the substructure started early last June, and the two abutments and five piers were com-

(Continued on page 73)

REVOLVING CRANES PLACE CONCRETE IN DAM



C. & E. M. Photo
Concrete in 2-yard buckets is placed in Center Hill Dam in Tennessee. Massman Construction Co., Metcalfe Construction Co., and the Gordon Hamilton Contracting Co. joined forces for this flood-control and hydroelectric project described on page 44.

Large County Road Program; Snow Fight Helped by Radio

Highways Are Improved by Varied Methods; County Also Operates Lake Ferry; Maintains 609 Road Miles

† CHAUTAUQUA County, N. Y., has over 519 miles of roads of various types of construction in its county road system. It has 90 additional miles of unimproved roads. Each year a certain number of miles are improved, either by reconstructing the road according to its present type of surface, or by building a higher-type surface to handle increased traffic. All construction and maintenance work is done by county employees.

Chautauqua lies at the far western boundary of New York State, with Pennsylvania to the south and west, and Lake Erie to the north. Its population of 123,553 is fairly dispersed throughout its 1,102 square miles, since the county has only two cities: Dunkirk, a lake port, with 17,713 residents; and Jamestown, in the south, with a population of 42,638. Industry within the county is located chiefly in these cities. Dunkirk has a steel mill, while Jamestown has several factories, the largest of which manufactures furniture and metal doors.

Along the northern fringe of the county, in the gently rolling land bordering on Lake Erie, are great vineyards and fruit orchards. South of this region a long ridge of hills crosses the county from west to east. Southward from the ridge the topography is hilly and many dairy farms are scattered over the landscape. The principal geographic feature is Chautauqua Lake, running down through the center of the county, where the famed Chautauqua Assembly is held every summer. Jamestown is at the south end of the lake, and Mayville, the county seat, is at the north end.

Types of Highways

A breakdown of the county-road mileage includes the following types:

Block pavement (brick, asphalt, stone, wood)	1.19
Concrete	44.19
Bituminous macadam, penetration method	97.24
Bituminous macadam, retread or machine-mix	187.10
Waterbound macadam	1.00
Gravel	188.66
Total—surfaced roads	519.38
Unimproved roads	89.77
Total mileage—county system	609.15

All the surfaced roads are at least 17 feet wide, laid out on a 3-rod right-of-way. County forces maintain these roads the year through. In the summer the banks are cut back, ditches opened up, culverts cleaned out, and the grass mowed. All these summer maintenance

By WILLIAM H. QUIRK,
Eastern Editor

operations are of great help in snow removal during the winter.

The County also has 400 structures on its list of bridges and culverts to maintain. After some floods last year several bridges needed strengthening. Quick, yet sturdy, repairs were effected at several locations by driving a row of steel I-beams, 8 to 20-inch sections, to serve as abutments or piers. These were capped with steel channels and other I-beams were laid across the top as stringers. A deck of 4 x 8 tongue-and-groove creosoted plank, or reinforced concrete, served as a bridge floor.

The County is now operating on a 5-year program of 120 miles for construction and reconstruction. The program was adopted by the Board of Supervisors in 1937 but was interrupted by the war. New construction started last year, and the program is 58 per cent complete. The County builds three classes of roads. Class A is a first-class

County Eliminates Waste Movement of Snow-Removal Equipment on Highways by Radio Communication

† CHAUTAUQUA, most western county in New York State, experienced a snowfall of 120 inches last winter. This is not unusual, as 10 feet of snow in a winter is the normal expectation. Blowing in from the west across Lake Erie which borders the county on the north, great storms generally whip the snow in huge drifts as it falls. Thus the Chautauqua County Highway Department has a big job on its hands—keeping open 816 miles of highways. Of this mileage 519 miles are surfaced county roads, and the remaining 297 miles are on the state highway system. The County removes snow from all the state highways within its borders, and in turn is reimbursed by the State.

In this annual snow fight a two-way radio-telephone system is of considerable help and importance to the county



C. & E. M. Photo

Here is Carl Sutton at the dispatcher's desk at WAXE, main transmitter station of Chautauqua County's two-way radio-telephone system.

road; it usually has an 18 or 20-foot pavement, depending on traffic demands. Class B is built to the same specifications except that black-top is omitted; it has an oiled gravel foundation with a surface treatment and cover coat. Class C is a 16-foot gravel farm-to-market road.

To move dirt short distances on its jobs, the County employs three tractor-dozers—a Caterpillar D6, a D7, and a D8. On longer hauls it uses a LeTourneau 15-yard Carryall pulled by a D8. Shaping up is handled by either a

(Continued on page 17)

highway forces. From a central control point at county headquarters in Falconer, orders are sent out through a transmitter station to all plows and trucks on the highways. In this way, waste movement of units and dead mileage is eliminated.

All units are in practically constant touch with headquarters, and to a certain extent with each other. A truck driver does not have to leave an urgent job and wade through slush and snow to call the office. He simply keeps on plowing and gets his orders through the radio in his cab. A foreman does not

Two-way radio telephone helps Chautauqua County whip its normal 10-foot annual snowfalls. Lawrence Worster, at left, receives orders from headquarters in the cab of an Oshkosh truck. In the pick-up truck, right, the receiver and transmitter set is contained in a metal box within the truck body.



C. & E. M. Photo

In the radio repair shop, Bob Olson, radio technician, checks a Motorola transmitter used in the Chautauqua County radio-telephone system.

have to waste vital minutes leaving his job. Nor does he take the chance of having his message misunderstood by a third party sent to do the telephoning. He simply presses a switch and his voice travels with lightning speed to headquarters.

County Sets Pace

The Chautauqua County Highway Department is one of the forerunners in the use of this modern method of communication. It installed a Motorola FM radio-telephone system throughout the county shortly before the war, and its benefits were felt immediately. In 1941 the County had 36 units for snow removal on a 700-mile system. About 60 per cent of these units were hired trucks used in construction and maintenance during the summer months, and on which were mounted snow plows in the winter. However, the Army's great demand for construction equipment, including trucks, left the County at the beginning of the winter of 1942-43 with 12 less snow-removal units.

With one-third less equipment, but with the aid of radio, the county forces managed to keep all the highways open. This was due to the efficient directing of the equipment on hand through the two-way radio. The technique of snow removal also experienced a change. In the past, heavy plows and rotaries were usually sent out automatically on highways where drifts were known to occur. The results were not too satisfactory in such cases, as the slow-going equipment operated only about 30 per cent of the time.

Now light, fast plows equipped with radio cover the roads and skirt the drifts without a thought of bucking the deep snow. Instead, the driver notifies the dispatcher of the location of the drift. From this information the dispatcher, through radio, orders the rotary plow or other heavy units to the trouble zone. The process continues, with the lighter plows removing the lighter snow while the rotary plows tackle the big drifts. Experience has proved the resultant economy of this control by radio.

Also, safety is increased, for if a crew is in trouble, or if it finds motorists in need of help, aid can be rushed at once to the scene. The radio has a powerful effect, too, on the morale of the workers. Men do not hesitate to go out in the worst weather when they know that help is no farther away than the microphone on the dashboard.

The public, of course, receives the greatest benefits from radio. Roads can be opened more quickly, or detours can be handled more advantageously. Additional units can be rushed to snow-blocked highways which could hold up vital emergency service such as fire, police, ambulances, doctors, etc., thus permitting help to reach the stricken ones before it is too late.

Federal Control

The two-way radio system in Chau-
(Continued on page 87)

A new addition to Minnesota's State Highway System

The newly completed Texaco Asphalt pavement on 14 miles of State Highway No. 15 south of Hutchinson, Minn.

Constructs 14-mile project with pit-run gravel and TEXACO



Laying the 1½-inch Texaco Asphalt surface on 10-inch stabilized pit-run gravel base. Contractor: Duininck Bros. and Gilchrist, Olivia, Minn.

This recent project on Minnesota's Route 15 is another good example of how low-cost local aggregate and Texaco Asphalt products build high-type, durable roads at moderate cost.

To provide a foundation which would be substantial yet economical, Minnesota engineers specified 10 inches of stabilized pit-run gravel. After priming the foundation with a Texaco Cutback Asphalt, they laid a plant-mix asphalt top 1½-inches thick. A 150-200 penetration Texaco Asphalt and pit-run gravel made up the mix, which gives this highway a tough, resilient, lasting riding surface.

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Contractors and Engineers Monthly

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Give the Public the Highway Facts; Understanding, Support Will Follow

The responsibility of carrying out our vital highway program is a serious one. And highway officials, on whom the initiation and planning of the program rest, cannot advance road building at the pace required without the understanding and support of both the contractors who build the highways and the public which uses them.

This brings us once again to the subject of public relations. Good public relations must be based on mutual confidence, and open and fair dealing. Contact, confidence, and cooperation are basic in a public-relations program. First, the public must be informed, with accurate reliable facts. Highway departments must make use of all available media—press, radio, citizens' committees, service clubs—to tell the public of the state's highway needs, to explain the reasons why all the required construction isn't under way, and most of all, to "sell" a willingness to pay for highways.

Contractors want to know what the highway plans are; what types of construction are being considered for next year and the year after; how plans and specifications may affect their plans and purchases. They too want information. And open frank discussion with contractors—individually and in groups—can and will result in clearer understanding and greater cooperation in the task of providing the maximum highway improvement with the funds and facilities available.

It has been amply demonstrated in the past that, where the public has all the facts, it will support measures for an adequate highway program. In those states where an informational campaign has brought a complete public understanding of the gas-tax diversion problem, anti-diversion amendments have been passed overwhelmingly. California's passage of its highway bill has been attributed to (1) its highway planning surveys which provided the basic facts about the motoring public's wants and needs; (2) the use of those facts to inform the public; (3) almost unprecedented unanimity of the press in its vigorous support of the bill.

It is no longer necessary to "sell" the public the idea of good roads. But it is necessary to tell the public the facts. It wants adequate well maintained highways; it is becoming increasingly annoyed with substandard roads and with present highway congestion. It wants more, wider, better, and safer highways now; it wants to know why it isn't getting them. It wants its tax money used for highway purposes; and it wants to know how that highway money is being spent. It wants efficient highway-department administration; and it wants to know if it is getting it.

Some highway departments are doing a notable job in creating good relations with both contractors and the public.

Others are making a start at informing the public—feeble at first but, we hope, growing in strength and effectiveness. And some are still apparently hiding their light under a bushel. For these particularly, we urge positive action.

First, know the highway needs of your state. Then develop a highway program based on those needs. And then use all means available to tell the public about it, including the reasons why the plans can't be completed immediately. Give it the facts—let it know how much money is available; how much more is needed. Explain any other factors, such as high bids, materials shortages, lack of trained personnel, which may be delaying the program. Along with this, give the public efficient economical non-partisan administration. See to it that contacts of highway-department employees with the public are courteous and friendly. Remember that a highway department is a service organization.

And that goes for contractors too. They also have a responsibility towards the public, and can affect its thinking about highways. Detour signs can be friendly and regretful instead of peremptory. Use job signs to inform the public of work going on, under contract, and the benefits to result. This can redound to improved public relations for both contractors and highway departments. It will add up to greater

public interest and support for the highway program.

Contractors and engineers are continually concerned with the problem of strength—strength of subgrade, strength of steel, strength of concrete. But the strongest man-made thing in the world is fashioned of none of these. For the strongest man-made thing in the world is public opinion. Gain and use that strength in support of a well planned continuing highway program geared to our highway needs.

Pan-American Meeting Planned by Engineers

A Pan-American Engineering Congress is being planned by United States and South American engineers for late 1948 or 1949. It will be held in South America. The congress is fully supported by the Committee on International Relations of the Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. Canadian engineers are also being invited to participate through the Engineering Institute of Canada.

At a planning meeting—recently held in Lima, Peru—Bogota, Colombia, was suggested as the site for the first congress. Participation will be recommended to all constituent societies of the Engineers Joint Council: the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, The American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Chemical Engineers.

Chairman of the Committee's Commission on Latin America is Dean S. S. Steinberg, of the University of Maryland. Dean Steinberg has spent much time in contact with South American engineers. And in commenting upon the congress, he said they have a great desire for such a western-hemisphere meeting. He stressed that benefits would accrue to all countries taking part.

City Road Program Lags

Figures released by the Public Roads Administration indicate that city highway improvements are lagging behind other phases of the Federal-Aid program. Only 17 per cent of the funds available for urban improvements are now represented by awarded contracts. This can be compared with a figure of 40 per cent for primary highways and

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33 per cent for secondary roads.

Only 1 per cent of this figure represented completed contracts as of October 1, compared with 10 per cent for primary roads, and 11 per cent for secondary roads.

This slower rate of progress can be attributed to the greater amount of planning required, and to the difficulties inherent in securing right-of-ways in cities, the necessity for advance arrangements in financing, etc.

The general picture on Federal Aid as of October 1 is that 32 per cent of the funds apportioned to the states under the Federal-Aid Act of 1944 is already under contract. This amounts to \$471,000,000. After state matching of Federal grants, this figure enlarges to \$934,000,000. Projects already completed account for \$118,000,000, and projects actually under construction account for another \$304,000,000 of the Federal funds. As of the same date—two years after the first funds were made available—\$546,000,000 in Federal funds was not programmed and was still available for new projects.

Bureau of Reclamation Needs Engineers in West

A call has been issued by the United States Civil Service Commission for engineers for duty with the Bureau of Reclamation. The positions to be filled are in the states of Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. The salary range is from \$5,905 to \$9,975 a year.

To qualify, applicants must meet one of these basic requirements: (1) completion of a standard professional engineering curriculum leading to a bachelor's degree; (2) four years of progressive technical engineering experience; or (3) any combination of (1) and (2). In addition, they must have had four years of broad and progressive professional engineering experience. No written test will be given; candidates will be rated on their experience and training relevant to the duties of the position.

Applications are desired from those whose experience and training qualify them for engineering or engineering administrative work within the scope of the Bureau of Reclamation. Further information, and application forms, may be secured from most first and second-class post offices; Civil Service regional offices; or from the U. S. Civil Service Commission, Washington 25, D. C. Send applications to Executive Secretary, Central Board of U. S. Civil Service Examiners, Bureau of Reclamation, Building 1A, Denver Federal Center, Denver, Colorado. Applications will be accepted until further notice.

American foreign policy has taken a seat at the family dinner table. Save meat—save wheat—save the peace.



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***BONUS:** "Something given in addition to what is usual or strictly due."—Webster's Dictionary

LIFE INSURANCE EXPERTS PROVE...FORD TRUCKS LAST UP TO 19.6% LONGER!

Contractors Speed Gigantic Irrigation-Reclamation Job

Rugged Terrain Whipped By Sound Engineering And Visionary Design on Columbia Basin Project

MAN'S dream of water for thirsty acres—this time more than 1,000,000 acres in rich eastern Washington—has culminated in the start of the Columbia Basin Project, the biggest of them all, to date.

Before the last shovel of earth is turned many years hence, a job so big it staggers the imagination will have been accomplished. And with it, the economy of eastern Washington, the Pacific Northwest, indeed of the nation itself, will have been changed by what man has wrought. Credit for the design of structures which will train Columbia River water from Grand Coulee Dam south 172 miles towards Pasco must go to civilian engineers of the U. S. Bureau of Reclamation, who conceived the great project.

The following data, gleaned from the Bureau's own records, will give an idea of the magnitude of the Columbia Basin Project. It is impossible, of course, even to estimate the number of individual acts bordering on heroism which have gone into the conception, exploration, and design of all the structures through some of the roughest terrain in any irrigation project in the world.

Project Geology

To understand the engineering features of the system, it is necessary to know something of the geology of the area in eastern Washington.

The Columbia Basin Project is entirely within a geologic province known as the Columbia Plateau, built up by

By RAYMOND P. DAY,
Western Editor

successive flows of lava to depths exceeding 5,000 feet. Portions of the plateau were severely eroded by glacial waters during the Ice Age.

These topographic conditions greatly influenced the design of the irrigation system. Prehistoric water courses are being put to work wherever possible. The Grand Coulee, an Ice Age diversion channel of the Columbia River, will be blocked by dams to form an equalizing reservoir that will also carry water 27 miles towards the lands to be irrigated. A dam at the lower end of Long Lake will save 5½ miles of canal construction through solid rock. A fourth dam, south of Moses Lake, will impound water in the scoured Potholes Basin. On the other hand, the rough topography requires the construction of many siphons and several long tunnels to carry water across coulees and through ridges.

System Has Many Features

The Columbia Basin Project irrigation system contains the following major features, starting from Grand Coulee Dam, which is already finished:

1. Grand Coulee Dam Pumping Plant, the world's largest.
2. A feeder canal 1.6 miles long, leading from the pumping plant to an equalizing reservoir in the Grand Coulee.
3. An equalizing reservoir 27 miles long and from 1 to 5 miles wide to be formed in the Upper Grand Coulee by the North and South Coulee Dams.
4. Main Canal, leading from the equalizing reservoir to division works east of Soap Lake, Wash., including:

(Continued on page 90)

Latest Concrete Methods On Giant 25-Foot Siphon Barrels Contrast With Hand Work on Transition

OF all the dams, huge canals, tunnels, pumping plants, and other brilliant engineering tricks the engineers of the U. S. Bureau of Reclamation designed in the distribution system of the Columbia Basin Project, among the toughest of all to build are the great reinforced-concrete siphon structures, which carry irrigation water down across the low coulees and back up to grade on the far side.

The first siphons in the West Canal are no exceptions. Designed for a capacity of 5,100 cfs, they are 25 feet in diameter, with 24-inch reinforced-concrete shells. Known as Dry Coulee Siphons No. 1 and 2, they are being built as a part of the West Canal by the joint-venture firms of Utah Construction Co. and Winston Bros. Co. Their \$2,871,796 contract with the U. S. Bureau of Reclamation includes about 5½ miles of lined and unlined canal, and 5,500 feet of siphon. The siphon part of the general contract totals \$1,208,994.

To make the pours, a set of all-steel concrete forms weighing 80 tons is being used. It is rail-mounted, and capable of holding the tremendous weight of 180 cubic yards of concrete in each 25-foot-long monolith. The special rig was built in Denver by Universal Form Clamp Co. It includes collapsible inner shells and an outer shell form, which can be tightened or spread by hydraulic jacks; the two forms are tied together by form bolts for the pours. Details on the machine will be found later in this



C. & E. M. Photo
General Superintendent Roy Harer, left, and Project Manager George Mann discuss job problems on the Winston-Utah contract, in front of Harer's office.

article.

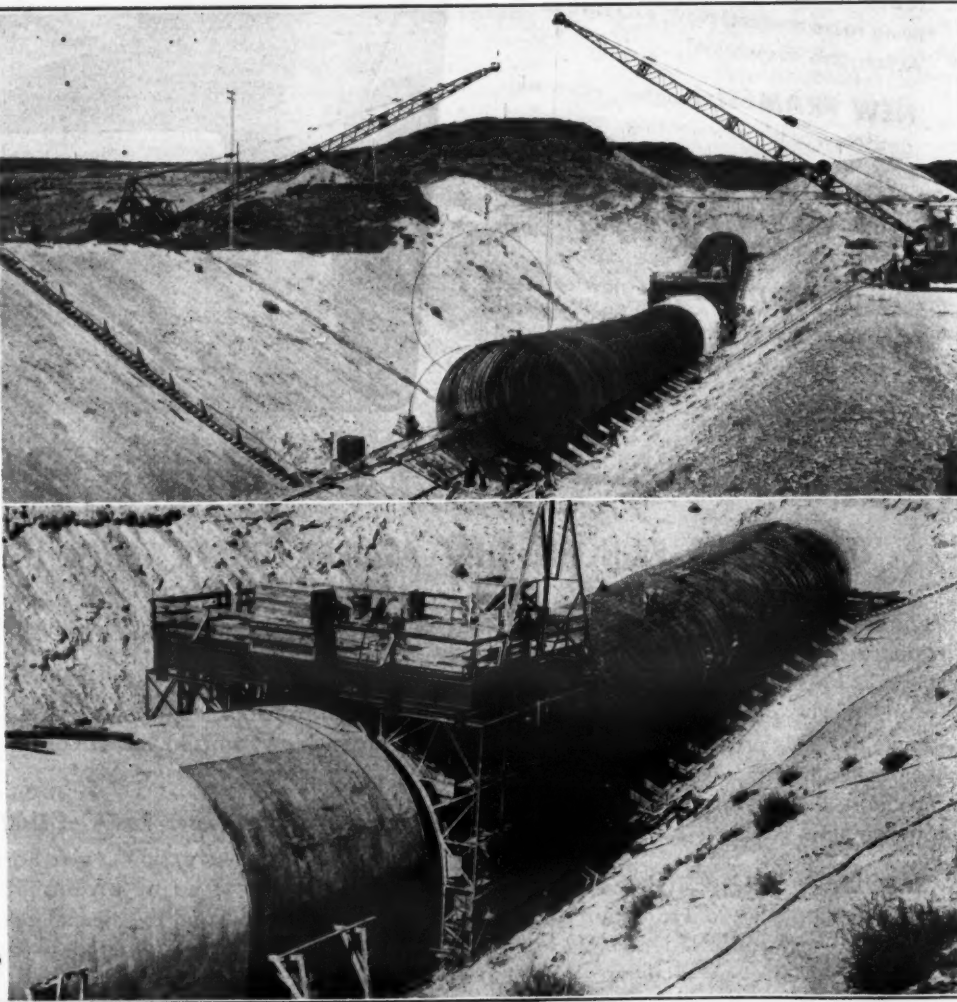
In contrast to the highly mechanized siphon-barrel work is about 1,900 feet of transition canal with a bottom width of 12 feet. This section had to be trimmed and lined with concrete largely by methods 25 years old, but the work is proceeding nicely along with the other parts of the contract.

West Canal Important Link

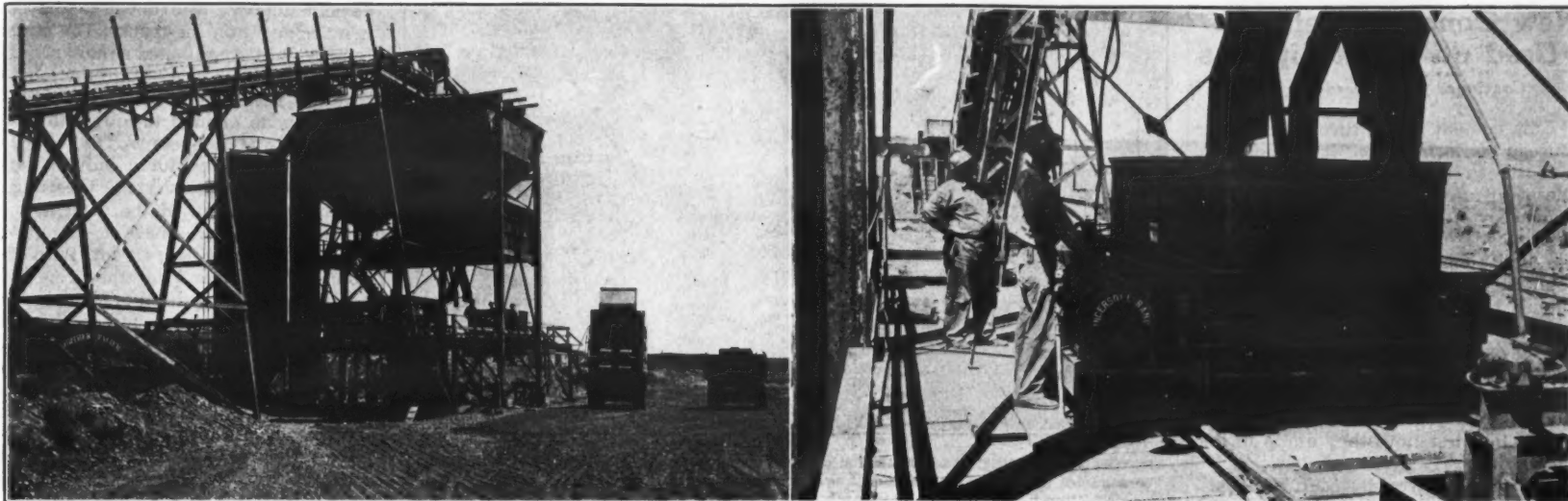
The West Canal, on which the initial Winston-Utah contract activity is under way, is a vital part of the great 1,029,000-acre land-reclamation and power-development Columbia Basin Project. It will be 78 miles long when completed, and it will serve 281,000 acres. It will wind along near the northern and western boundaries of the project for about 50 miles, passing close to the towns of Soap Lake, Ephrata, and Quincy, Wash.

The Winston-Utah contract is the first work to be let on this part of the project. It started in October, 1946, and

(Continued on next page)



C. & E. M. Photos
At left is a guide map of the Columbia Basin Project designed by engineers of the U. S. Bureau of Reclamation. At right are photos of siphon-barrel construction on the West Canal, which is being handled by Winston-Utah. In the top photo, a Link-Belt Speeder truck crane (left) sets steel reinforcing, while the clamshell from a Michigan crane digs a support trench. In the photo below, the siphon-barrel form is being opened at the base to move ahead, while workers are tying steel at the right of the form. Steel fabrication, bending, and installation were sublet to Charles Hill of Los Angeles.



C. & E. M. Photos
Winston-Utah set up this concrete batch plant 5 miles from its contract on the West Canal of the Columbia Basin Project. Cement is unloaded from the boxcar shown at the left of the first photo and sent by screw feeder up to two Noble bulk-cement silos. Butler storage bins on top of the plant hold sand and aggregate. One of the contractors' twelve K-7 International trucks appears at the right of the first photo. The second photo was taken from the upper platform of the batch plant. It shows one of the General Machinery Co. rail-mounted transfer cars being loaded. An Ingersoll-Rand Model HU air tugger moves the cars out to dumping position.

the contractors have 900 calendar days in which to finish the job. However, according to present rates of progress, the first link will be finished by the end of December, 1948, according to the General Superintendent of the project.

Batch-Plant Set-Up

In order to batch some 41,300 cubic yards of \$16.10 concrete for the siphon, and about 33,000 cubic yards of \$12.00 concrete for canal lining in other parts of the contract, a special batch plant was shipped in and erected within 5 miles from the job. It is being used to weigh sand, three sizes of rock aggregates, and bulk cement for the various-sized concrete batches.

The Butler sand and aggregate bins hold about 125 cubic yards in storage above the Kron dial scales which weigh the materials progressively. Sand and aggregates are produced under a separate contract 1½ miles distant and furnished to this contract by the Bureau of Reclamation. They are hauled from the production point by Winston-Utah's trucks. The materials are dumped to a receiving hopper and carried on a 170-foot conveyor run to the storage bins on top of the batch plant. There are no stockpiles over this conveyor, and trucks haul the sand and aggregate in as fast as the plant batches them out.

(Continued on next page)



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New Concrete Methods Used on Giant Siphons

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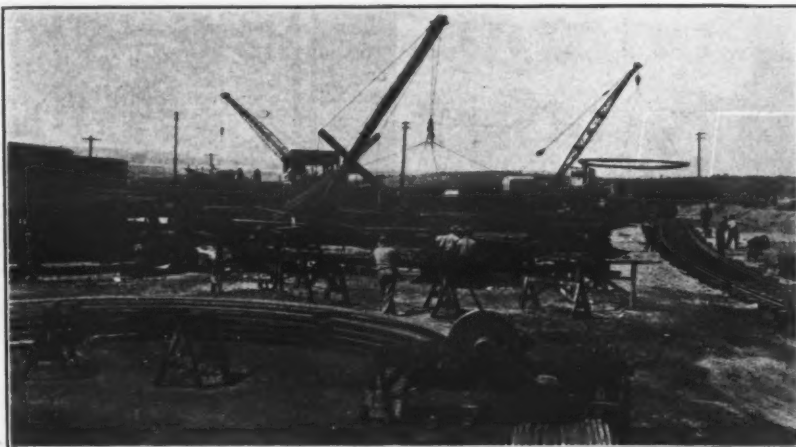
Bulk cement is also furnished by the Bureau of Reclamation. It comes in on a Northern Pacific Railroad siding at the plant, usually in boxcars. It is unloaded by a cement unloader to the screw feeder leading up to the two Noble bulk-cement silos of 1,500-barrel total capacity, an integral part of the set-up. Butler automatic electric scales proportion the cement.

One of the rather unusual requirements on this job is that while the cement and aggregates must be handled simultaneously, they cannot be mixed together until they dump to the mixer skip.

To meet that requirement, Winston-Utah purchased twelve K-7 International war-surplus trucks, had the frames and beds lengthened in Los Angeles by Cook Brothers, who also installed new hoists, and standardized their batch-plant set-up around these 4-batch trucks. Small cement hoppers with 12 x 12-inch automatic-closing bottom gates and 12 x 12-inch openings in the top were installed in each batch compartment. The bottom gates were rigged to close automatically by pressure when the truck bed was lowered.

Material weighed out of the batch plant passes down to two small 4-bin rail-mounted transfer cars, made by General Machinery Co. Here again the cement for each batch goes down into a center compartment in each hopper. The sand and aggregates mix within each compartment. The cars are moved out to dumping position by a small Ingersoll-Rand Model HU air tugger, rigged with cables to the cars. These cars have air rams installed to open and close the bottom gates. As fast as the batch-plant operator can weigh out four batches to these cars, they are moved out to a rail stop which marks the exact dumping position.

The International trucks have little or no room to spare for erroneous spotting. So the roadway underneath the transfer platform is equipped with steel railroad rails, with the top of the rail to the inside, and set just to clear the truck tires. If a driver makes an error in aligning his truck, these rails will hold him in line automatically once he gets under the plant. A rubber stop



C. & E. M. Photo

Fabrication, bending, and installation of steel reinforcing for West Canal siphons have been sublet to Charles Hill of Los Angeles. This view of his steel yard shows a bending machine in the foreground, hoop welding under the wooden derrick, and a Lorain crane loading finished reinforcement in the background.

which just touches the forward part of the truck bed marks the point where the truck must stop.

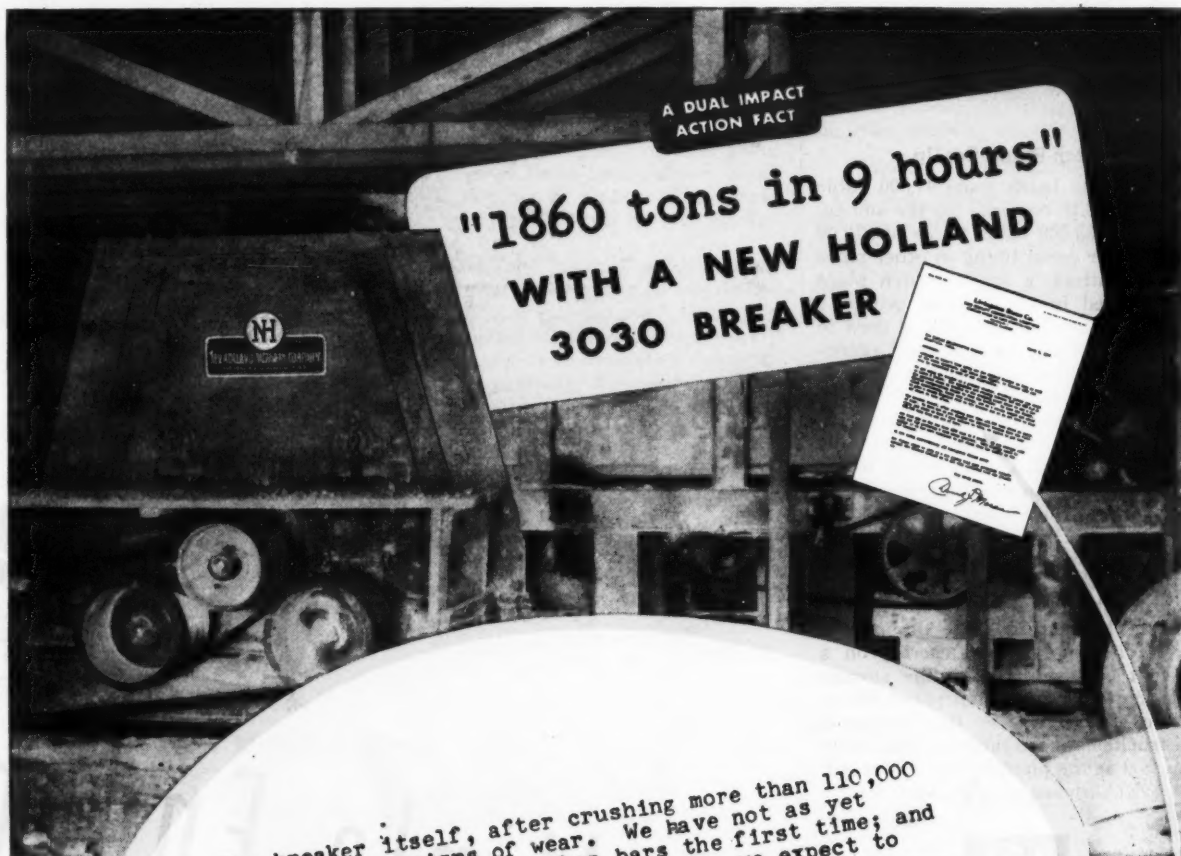
At that point, the International truck is exactly in position under the transfer car. The canvas guide sacks under the

cement hoppers lead down to the cement hoppers on the trucks. The entire four batches are dumped simultaneously, and the truck roars off to the job.

It has been found that bulk cement is puffing up enough to crowd the capacity of the hoppers on the trucks. They were figured for a bulking factor of 20 per cent over the theoretical volumetric content of the cement, but sometimes the presence of entrapped air stretches that figure a bit. With 654 pounds of cement in the 1 1/4-yard batches being used on siphon-barrel pours, the hoppers are full to the top.

All concrete is mixed to the same basic proportions, and the supply of aggregate is controlled as to moisture content to keep the concrete yield and consistency uniform. Sand and aggregate are held under 3 per cent of moisture by weight, and the batch proportions figured accordingly. No compensation is made on the scale weights so long as the moisture content stays under the 3 per cent.

(Continued on next page)



The breaker itself, after crushing more than 110,000 tons shows no signs of wear. We have not as yet changed the impeller breaker bars the first time; and since we have 3 more corners to turn, we expect to get over 500,000 tons from one set of bars.

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The Bureau of Reclamation concrete, famed as the most exacting in the nation, is weighed out as follows:

For Canal Lining, 1/2-Yard Batch:

Sand	602 lbs.
Rock, 3/4 to 1 1/2	320 lbs.
Rock, 1 1/2 to 2 1/2	480 lbs.
Rock, 2 1/2 to 3 1/2	272 lbs.
Cement	262 lbs.

For Canal Lining, 1-Yard Batch:

Sand	1,179 lbs.
Rock, 3/4 to 1 1/2	538 lbs.
Rock, 1 1/2 to 2 1/2	640 lbs.
Rock, 2 1/2 to 3 1/2	960 lbs.
Cement	524 lbs.

For Siphon Barrel, 1 1/4-Yard Batch:

Sand	1,474 lbs.
Rock, 3/4 to 1 1/2	672 lbs.
Rock, 1 1/2 to 2 1/2	800 lbs.
Rock, 2 1/2 to 3 1/2	1,200 lbs.
Cement	634 lbs.

The batch trucks are all owned by Winston-Utah, and just enough of them are used to keep the mixer well supplied. On a day when a siphon barrel is being poured, for example, two batch trucks handle the hauling on the short distance of 1/2 mile.

Siphon-Barrel Concrete

Construction of Dry Coulee Siphons 1 and 2 is easily the toughest part of the Winston-Utah contract, and promises to be one of the most difficult construction problems of the entire system.

The big steel form, made especially for this job, consists of an outside steel shell form mounted on steel railroad rails, two inner collapsible shell forms, and a 19-ton gantry which works inside the siphon barrel and moves the inner forms ahead to the next pour. The steel railroad rails which carry the machine are set on a special concrete foundation; this was mixed and poured by the contractors at their expense especially for this purpose. The concrete support was used instead of ties on account of the varying nature of the soil.

The form has several gores of different widths; these cover the opening created whenever the pours are made which break up or down. At one point where the huge siphon leaves a level grade to start up a 14 per cent rise, the bottom of the form is 13 1/2 inches away from the base of the previous pour.

With tremendous quantities of steel reinforcement in the concrete, the placing of steel bulkheads at the end of the pour takes as much time as the setting up of the steel forms. Four monoliths had been placed when the writer visited the job, and at that early stage of construction each pour required about 4 days, including the setting up of forms. However, the initial "bugs" are now out of the forms, and the work will be geared so the forms can be moved ahead in 16 hours and a pour made the remaining 8. That will be one 25-foot section per day, and will run the first 4,400-foot siphon out in good time.

The outside steel form is spread and raised by ten 10-ton Logan hydraulic jacks. Eight of these jacks mounted on the rail-mounted inner gantry collapse, raise, and move the inner forms ahead. The jacks are also used to spread them back to line. The two forms are held in place, secure from movement during the pour, by 19 form bolts one inch in diameter, on each side of the wall. After the forms are stripped, the surface holes left where the form nuts unscrew are filled with dry packed cement, and dressed smooth.

These big forms have to hold the pressure of 729,000 pounds of concrete as it goes down through 15 hatches into the forms. Add to that the thrust of steel reinforcement on an up-grade, and you have some idea of what the men have to contend with.

Most of the early difficulty with the set of forms consisted of adjustments to the hydraulic rams, and of burning the necessary holes in various places to facilitate moving them around.

When the form is set up and fastened in place, and the tricky 16-piece bulkhead worked in around the steel reinforcing, the batch trucks dump to a

Ransome 34-E paver mounted up on top of the bank over the siphon pipe. This machine has been fitted with a special boom 70 feet long, which hooks on to a steel tower atop the form and permits the mixer bucket to travel out to a transfer hopper on top of the form.

The invert of the siphon is poured by chuting the concrete down to a small Gar-Bro bucket on the gantry frame, and placing it through bottom hatchways. Four small Chicago Pneumatic and Ingersoll-Rand vibrators are used on each side of the pour as it progresses. When the concrete has built up almost to the spring line, the concrete goes in through special hatches in the sides of the form. These hatches have an outside box into which the mix drops through Gar-Bro hoppers and elephant

trunks, and the concrete feeds gently in without segregation of the coarse rock. The hatches are blocked off as the concrete gets up to their level, and the extreme upper section of the pipe is finished off by hand where the concrete is not encased by the outside form.

By using a few very small men in between the steel to handle the vibrators, the contractors have secured excellent vibration. And the pours already made are stripping out well. They are being cured with Hunt Process white-pigmented solution.

Reinforcing Is Big Job

The quantities of steel reinforcing in the siphons are enormous, and of interest to irrigation-structure engineers. Almost 15,000,000 pounds are being in-

stalled. Although the Bureau of Reclamation was to furnish this material, it could get no bids when the invitations were made, and the steel is being furnished by the contractor.

The fabrication, bending, and installation of steel has been sublet to Charles Hill of Los Angeles. Hill has set up a modern assembly-line steel yard along a railroad spur of the Northern Pacific, about a mile distant from the first 4,400-foot siphon.

The bars come in bundles not over 6 tons, and are unloaded by a Lorain Moto-Crane. A 30-foot spreader bar is used to prevent the steel from warping. The steel is stacked neatly in line with the first of the machines which have to work on it.

(Continued on next page)

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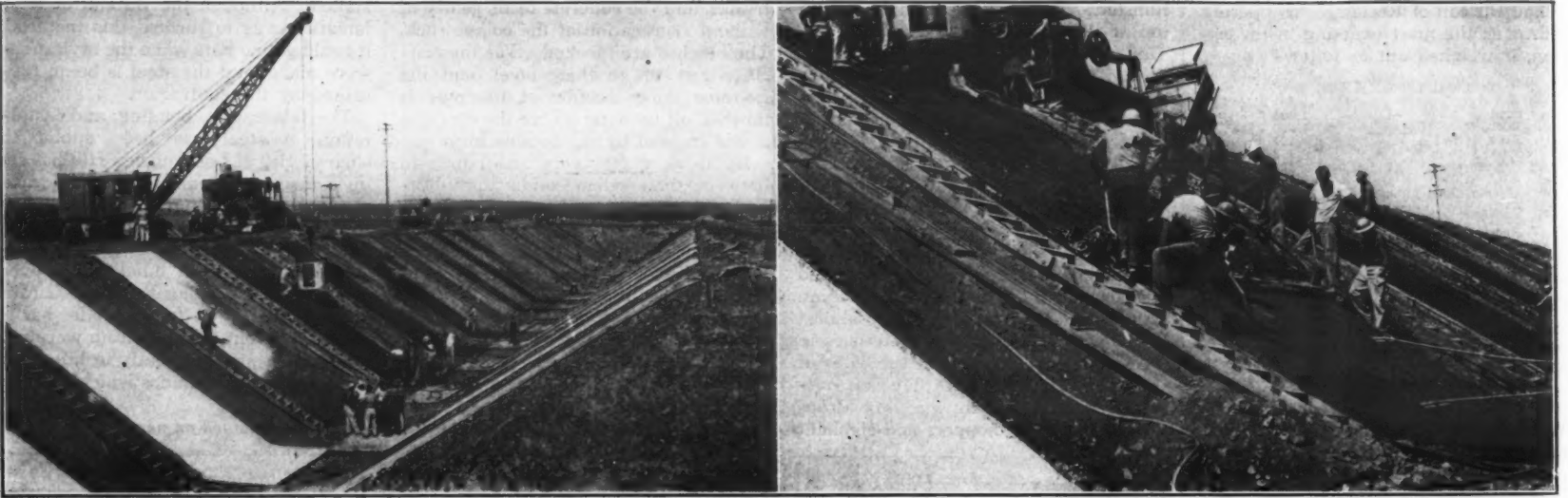
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C. & E. M. Photos
Some 1,900 feet of transition canal with a bottom width of 12 feet had to be trimmed and lined with concrete under the Winston-Utah contract with the Bureau of Reclamation. At left, a Gar-Mro bucket on a Northwest crane dumps concrete from a Ransome paver to the side of the canal, while workers spray white Hunt Process solution on the finished slab. At right, looking up the canal slope, we see concrete being dumped and men operating the vibrator. Two Beebe hoists, mounted on a timber frame at the top of the bank, tug the vibrating screed up the slope.

New Concrete Methods Used on Giant Siphons

(Continued from preceding page)

Because the reinforcing hoops have to be cut to exact length, the steel for the circular ribs passes through a Kenlin Kutoff machine, which saws the ends off square, and to length. Great square bars up to 1 1/4 inches on a side make up these hoops. Coming out of the cutting machine, they pass through a bending machine which curves each bar to the proper radius. Each bar is curved to make one half of the finished hoop. After it comes off the bending machine, a gin-pole derrick with an American 2-drum general-purpose hoist powered by a Fairbanks-Morse engine stacks the bent pieces.

The Lorain Moto-Crane then transfers them to a circular table, where two pieces are flash-welded together at the butt ends to make a continuous piece of steel. A Federal Type F-4 flash welder set on the circumference of the fabricating table performs this operation. Flash-welding of reinforcing steel, a new technique which replaces the old system of lapping and splicing the bars, develops at least 90 per cent of the tensile strength of the bar, and tests are run each day to insure this result.

Flash-welds of 1 1/4-inch bars are made in 72 seconds, 1 1/2-inch bars in 59 seconds, and 1 3/4-inch bars at 31 seconds. Fully welded, the 1 3/4-inch outside hoops weigh 966 pounds each.

When the weld has been made, the pieces are stacked to one side by a second timber-boom derrick. They are then hauled out to the job after being loaded by the Lorain Moto-Crane. The entire operation is set up so that a piece of steel keeps moving from the time it is taken from the stockpile until it is ready to go out to the job; it is never allowed to stop. The cost of handling, bending, flash-welding, and so on is all included in the contract price of 2.2 cents per pound for placing the steel. There is, of course, the cost of buying the steel, added to the price for placing.

The steel is set in place out on the siphon by a new Link-Belt Speeder truck crane, with an 80-foot boom. The first ribs in each monolith are set true to a template, and succeeding steel built to this guide piece. The steel is placed to a close tolerance.

Some interesting problems develop in the monoliths which go up or down grade. According to Charlie Hill, on one such monolith upgrade on a 14 per cent slope, the overhang or dead weight of steel was 125 tons, accumulated from seven of the 25-foot sections. Cables are used to tie this weight off and hold the steel in place.

Dry Coulee Siphon No. 1 will pass under the Northern Pacific railroad tracks and a county road.

(Concluded on next page)

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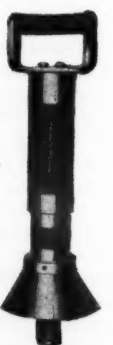
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All in all, the big project is proceeding rapidly and on schedule. Tough as the huge siphon barrel has been, the first problems with the form were the worst, and the job is running nicely in a systematic manner. Work on the siphon is going ahead on a 24-hour basis 6 days per week.

Concrete Canal Lining

An interesting contrast to the mechanized siphon methods is provided by the concrete lining of a 1,900-foot transition section, which will carry the water from Dry Coulee Siphon No. 1 through a relatively level section and into Dry Coulee Siphon No. 2.

The excavation of this section was certainly not at all antiquated, for a Marion Model 4161 electric dragline with a 6-cubic-yard Esco rock bucket was used, assisted by a new Marion 151M electric rig with a 7-yard Esco bucket.

However, the slip forms for the other canals would not fit the narrow 12-foot bottom width and the deep section without extensive and costly rebuilding. Even if the rebuilding had been done, the mechanical slip form might have had only a week's work on the short section. It was therefore decided to pour the section with mechanical equipment, but in a manner in vogue many years ago.

With a longitudinal contraction joint on the center line of the bottom of the canal, and transverse joints on 14-foot centers, this resolved itself into a situation where alternate monoliths could be poured every 28 feet. The earth and rock foundation is smoothed off by hand ahead of the steel crews.

The 16-inch grid of ½-inch round steel bars is secured in place by means of a 2 x 4-inch laminated-timber template, with 1-inch board between the 2 x 4's with an opening every 16 inches. The transverse bars are held in the same way at the bottom, and of course all reinforcing steel at the top has to be the usual 2 inches away from the face of the concrete.

Batch trucks discharge their 1-yard loads to the skip of a Ransome 34-E dual-drum concrete paver. The mixing water for all concrete is pumped from two wells on ranches 5 miles from the job, transferred to a temporary storage tank, and dispensed over the job through a 6-inch "invasion pipe line" left over from the war. Pipe stands at 1,000-foot intervals along the line permit trucks to take water, and valves are used to feed water through 500 feet of flexible rubber hose to the paver.

The concrete is mixed for 2 minutes and discharged to a 1-yard Gar-Bro concrete bucket, handled by a Northwest crawler crane. This machine then swings the concrete out over a pour, and a dump man pulls the lever to open the bottom dump gate.

Pouring always starts at the bottom of the canal, gradually working up the slope. The concrete is distributed, screeded, and vibrated by a heavy metal slip form, powered by a Wisconsin gasoline engine. This machine is set down at the start of the pour by the crane.

A rather ingenious but simple method is used to pull this vibrating screed up the side of the canal. Two 5-ton Beebe all-steel hoists, mounted on a stout timber frame at the top of the bank, tug the machine up as rapidly as the foreman can get the concrete placed. Instead of the conventional hand handle to turn these powerful little hoists, two Chicago Pneumatic Power Vane air guns are held up against the drive shafts by two laborers, and the tow cables do the rest. Workmen keep the concrete shoveled in approximately level just ahead of the screed, and the surface is left well vibrated and plastic.

The concrete surface is finished immediately by steel trowels on long handles, and the concrete surface is sprayed with Hunt Process white-pig-

mented curing solution. While the rate of progress does not compare with that of a slip form, one of the 14-foot half sections was placed in 45 minutes the day the project was visited.

Personnel

George M. Mann is the Project Manager for Winston-Utah, with Roy Harer as General Superintendent. Charlie Hill is running the steel. Harold Henshaw is Concrete Superintendent. Blackie Costner and R. F. Spann are Shift Superintendents. And Ted McDaniels is Rock Superintendent. The shop and maintenance section is under Herb McComber, with Ray Gail as Chief Electrician. R. L. Wahl is Office Manager and J. C. Agnew, Project Engineer.

H. A. Parker is the supervising engi-

neer for the U. S. Bureau of Reclamation. F. A. Banks is District Manager, and R. J. Newell is the Boise, Idaho, Regional Director, having general supervision of the Columbia Basin Project.

Meeting Stresses Safety

The importance of safety in construction was the theme of the autumn dinner meeting of the Constructors Association of Western Pennsylvania. There were 222 in attendance. An address entitled "Accident Prevention Is Good Public Relations" was presented by J. E. O'Leary, Chairman of the association's Public Relations Committee.

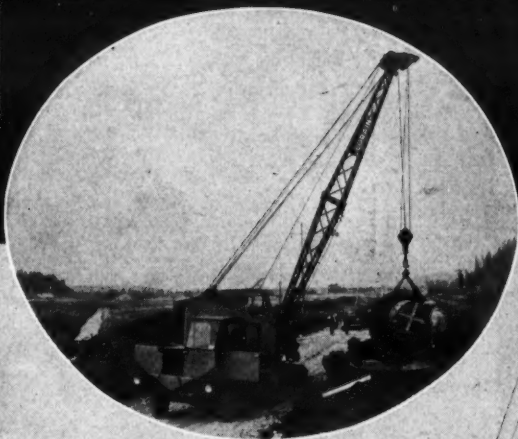
A safety skit to demonstrate how careful advance job planning can pre-

vent accidents was presented by Otto S. Holmskog, Senior Construction Engineer of the Employers Mutual Liability Insurance Co. of Wisconsin; Joseph E. Jackman; and S. D. Webb of Dravo Corp., Pittsburgh. G. O. Griffin, Safety Director of Dravo Corp., demonstrated a safety graph, "How to Lift", as a sample of the accident-prevention instructions which can be used for job safety meetings.

An interesting feature of the meeting was a cartoon contest in which the participants were required to note how many hazards they could find in a series of cartoons drawn by Industrial Indemnity of Los Angeles. First prize went to Thomas H. Stewart of the Jay C. Speaker Co., who noted 212 accident hazards.

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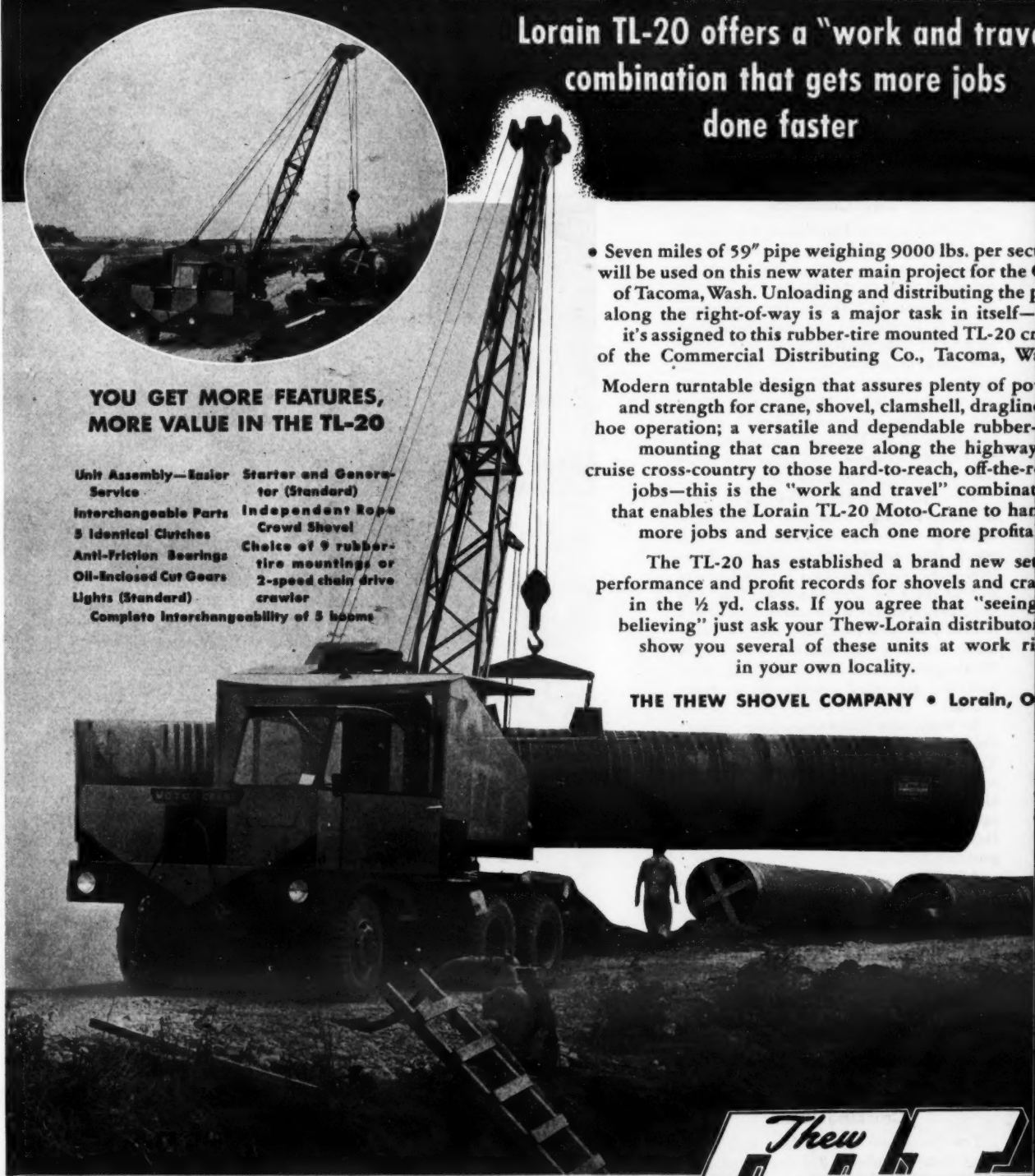
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• Seven miles of 59" pipe weighing 9000 lbs. per section will be used on this new water main project for the City of Tacoma, Wash. Unloading and distributing the pipe along the right-of-way is a major task in itself—it's assigned to this rubber-tire mounted TL-20 crane of the Commercial Distributing Co., Tacoma, Wash.

Modern turntable design that assures plenty of power and strength for crane, shovel, clamshell, dragline, hoe operation; a versatile and dependable rubber-tire mounting that can breeze along the highway, cruise cross-country to those hard-to-reach, off-the-road jobs—this is the "work and travel" combination that enables the Lorain TL-20 Moto-Crane to handle more jobs and service each one more profitably.

The TL-20 has established a brand new set of performance and profit records for shovels and cranes in the ½ yd. class. If you agree that "seeing is believing" just ask your Thew-Lorain distributor to show you several of these units at work right in your own locality.

THE THEW SHOVEL COMPANY • Lorain, O.



Lorain

Thew
TL-20
Lorain

Old Macadam Road Widened, Surfaced

**Stone for Both Operations
Quarried and Crushed on
40.2-Mile Job; Plant-Mix
Laid in Three Courses**

★ THE longest continuous highway improvement completed in Tennessee last construction season involved widening and surfacing 40.2 miles of an old macadam highway. The original 18-foot road consisted of a hand-placed Telford base, 8 to 10 inches thick, which had been topped with bituminous seal coats. On each side it was widened 2 feet with a 2-course penetration-macadam base, 8 inches deep. Following this, three courses of plant-mix asphaltic concrete were laid to the full 22-foot roadway width.

Wherever it was needed, a leveling course was laid first; it was from 1 to 1½ inches thick, depending on irregularities in the old pavement. Next came a binder course from 2 to 3 inches thick, according to the condition of the old surface. The top course was a uniform 1½-inch thickness. All the stone for the project was quarried and crushed in a field adjoining the road. The contractor's asphalt plant was also set up at this same location.

Two Contracts

The Tennessee Department of Highways and Public Works divided the job into two contracts, and subsequently awarded both to the Wesco Paving Co., of Chattanooga, Tenn. The improvement is located in central Tennessee, extending into both Warren and White Counties. One contract, 16.6 miles long in Warren County, included street paving in the city of McMinnville. From the city line the project bears to the north on U. S. 70S, or Tennessee 1, to the White County line. The bid price for this section was \$309,556.67.

The other contract, 23.6 miles long in White County, continues on the same highway to the town of Sparta. At this point the improvement follows Tennessee 42 nearly to the Putnam County line in the direction of Cookeville. The contract price for this section was \$449,325.39. The two contracts for the 40.2-mile improvement totaled \$758,882.06. Work was started early in June, 1947, and the job was completed in September.

In only one place was any change made in the alignment of the old road. Three sharp curves were eliminated in a subcontract given to McGee & Walker Co. of McMinnville. About 30,000 cubic yards of dirt was moved in this phase of the work; most of it came from borrow pits.

All the stone for the job was provided by Lambert Bros. Inc. of Knoxville, Tenn. A limestone quarry yielded the material which was then crushed to the required sizes. The crushing plant was located right off the road near Doyle, which is 7 miles below Sparta. The contractor set up his asphalt plant there also, to eliminate long hauls of material going into the job. It was on a siding of the Nashville, Chattanooga & St. Louis Railroad.

Crushing Plant

The limestone-quarry face had three sides totaling about 375 feet long and 100 feet high. At one end, blast holes were drilled with a Bucyrus-Erie well driller to a maximum depth of 60 feet. One bit usually sufficed for 30 feet before it had to be removed for sharpening. The holes averaged 7 inches in diameter and were charged with Atlas 60 per cent dynamite cartridges, 5 x 24 inches and weighing 50 pounds. The

holes were usually filled to within 15 feet of the top or less, depending on the depth of hole. They were drilled on 25-foot centers in a line 20 feet back from the quarry face.

At the other end of the quarry, 20-foot lifts were removed by first drilling blast holes with a couple of Ingersoll-Rand wagon drills. Power was furnished by two Gardner-Denver 500-cfm air compressors. Atlas 60 per cent dynamite was also used in these holes. A Northwest 1½-yard shovel loaded the stone from either end into two end-dump Euclids which hauled 20 tons each an average distance of 750 feet to the crushing plant.

The trucks discharged their loads into a 20-ton hopper. At the bottom of it was a Cedarapids feeder which moved the big rock chunks to a Tel-smith 42 x 36 primary jaw crusher. After coming from the crusher the material moved up a long belt, 36 inches x 170 feet, to a Cedarapids double-deck 4 x 12-foot shaker screen. On top the screen had 2½-inch openings, while the lower deck



C. & E. M. Photo
An Apsco Model 60 spreader lays the second course of stone in a 2-foot widening trench on the Wesco Paving Co. job in central Tennessee. A Buffalo Springfield 3-wheel roller follows.

was divided into 1-inch and ¾-inch-opening screens. Bins beneath collected

the three grades of stone.

Oversize from the top screen went off the side and into a pair of Symons 4-foot short-head secondary crushers. After passing through these crushers, the stone went up a 24-inch x 125-foot belt to a Pioneer 3-deck 4 x 10-foot vibrating screen. The decks from top to bottom had 1½, ¾, and ¾-inch square openings. The material from the screens dropped into bins. Two trucks pulled underneath the bins, picked up their loads, and hauled them to stockpiles which were built up close by. Each of the six different bins held around 20 tons of stone.

The plant was driven by a Murphy 150-hp diesel engine and three Caterpillar 13000 diesels. The Murphy unit operated one of the short-head crushers. One of the Caterpillars generated electric power for the conveyors, screens, and the well-drilling rig. Another ran the primary crusher and feeder, while the third drove the other short-head unit.

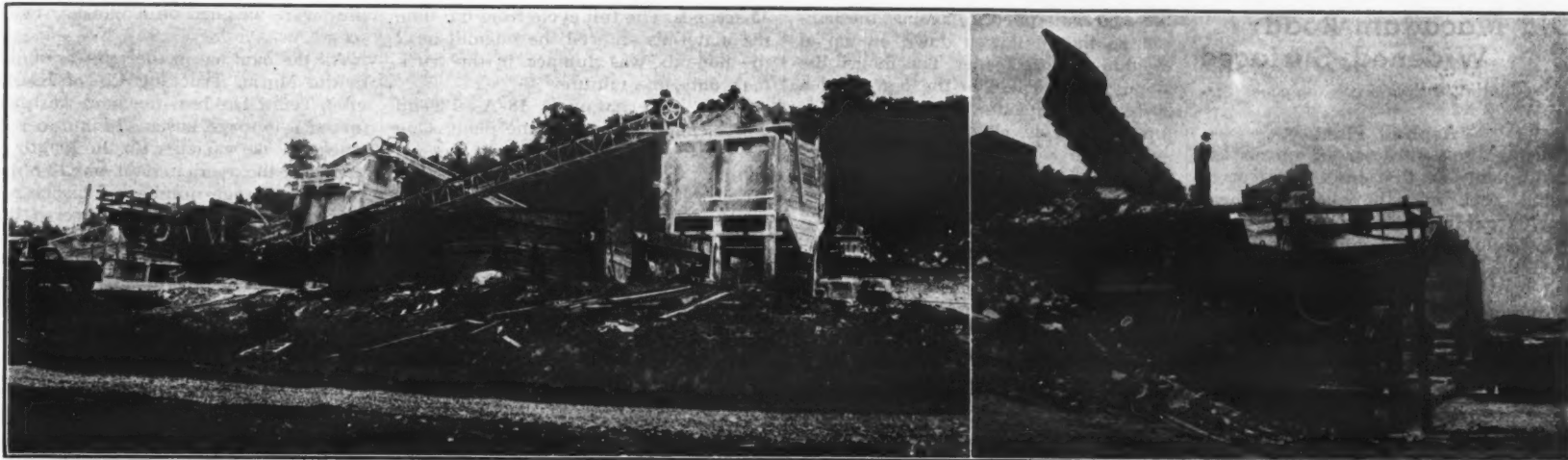
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TEXACO STAR THEATRE
presents the
TONY MARTIN SHOW
every Wednesday night.
METROPOLITAN OPERA
broadcasts
every Saturday afternoon.



TEXACO



C. & E. M. Photos

Here are two views of the crushing plant set up at Doyle, Tenn., for the macadam-highway improvement contract. In the first view we see the feeding hopper at left and the secondary crusher at right. The second view from the opposite end of the plant shows an end-dump Euclid sliding 20 tons of rock into the hopper above a Cedarapids feeder. Superintendent Riley Jenkins of Lambert Bros., which supplied all stone for the job, stands at the hopper.

All the material from $\frac{3}{4}$ inch down was set up in one stockpile to be used for the top course in the plant-mix road surfacing. For the other two courses, leveling and binder, a stockpile was made of stone graded between $\frac{3}{4}$ and

$1\frac{1}{2}$ inches. A stockpile with stone from $2\frac{1}{2}$ inches down was also made for the 2-foot widening courses. Another pile with stone less than an inch in size was for the choke course in the widening.

Riley Jenkins was Superintendent for Lambert Bros. Inc., at the stone-crushing plant.

Road Widening

The first step in the widening operation was to scarify 2 feet of the 5-foot shoulders adjoining the old pavement with the teeth of an Adams motor grader. Next a 2-foot-wide x 8-inch-deep trench was dug with a special drop blade built from the bottom of the regular grader blade on the Adams. The bottom of the open trench was then covered with a light layer of screenings as an insulating course. The material was taken from the bin containing stone graded from $\frac{3}{8}$ inch down. It held to the following specifications:

Screen Size	Per Cent Passing
$\frac{3}{8}$ -inch	100
No. 4	85-95
No. 100	10-30

The trench was filled with stone laid in two courses of 4 inches each. Trucks end-dumped the stone into an Apsco Model 60 spreader which was set for the exact width of the trench. After the first course was in, the stone was rolled by one of two Buffalo-Springfield 3-to-5-ton trench rollers on the project. The stone was then given a penetration shot, 0.5 gallon to the square yard, of 85-to-100-penetration asphalt. An Etnyre 1,130-gallon distributor on a $2\frac{1}{2}$ -ton truck applied the bitumen through seven jets left open at the end of the spray bar.

The asphalt was at once covered with a $\frac{1}{2}$ -inch layer of choke stone. This was applied through openings made in the tail-gates of the stone trucks so that the material could easily be chuted into the trench. Then the choke stone was rolled into the asphalt and base stone. This operation was repeated as the second layer of stone was laid in the trench, filling it to the level of the old pavement. The trench roller was not needed for rolling the second course, however; Buffalo-Springfield 10-ton rollers, both 3-wheel and tandem, did the work.

With this equipment, widening operations could keep ahead of the asphalt-laying crew. The gradations of the No. 8 base stone used in the widening, and the choke stone on top of each course, were as follows:

No. 8—Widening Stone	
Sieve Size	Per Cent Retained
$2\frac{1}{2}$ -inch	0-100
$1\frac{1}{2}$ -inch	30-70
$\frac{3}{4}$ -inch	85-100
$\frac{3}{8}$ -inch	98-100
Choke Stone	
Sieve Size	Per Cent Passing
1-inch	100
$\frac{3}{4}$ -inch	95-100
$\frac{3}{8}$ -inch	0-10
No. 4	0-3

(Continued on next page)

MAKE YOUR TOUGH LUBRICATING JOBS

EASY

Seal chassis bearings against dirt and moisture with Texaco Marfak

USE Texaco Marfak to protect vital chassis bearings in your earth-moving equipment, and solve one of your toughest lubricating problems.

Texaco Marfak is super-tough and long-lasting — doesn't budge from the bearings. It seals itself in — seals out destructive dirt and moisture. It prolongs bearing life, assures freedom from rust, smoother operation and lower chassis maintenance costs.

For wheel bearings, Texaco Marfak

Heavy Duty is the lubricant to use. It forms a fluid film inside the bearing, yet retains its original, firm consistency at the outer edges — sealing itself in, assuring safer braking. No seasonal change required.

The fact that more than 275 million pounds of Marfak have been sold, is your assurance of proved performance.

Use the Texaco Simplified Lubrication Plan. A Texaco Lubrication Engineer will gladly give you details. Call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 E. 42nd St., N. Y. 17, N. Y.

2 MORE LUBRICATION JOBS SIMPLIFIED

Dirt and moisture are tough on track rolls, also. Protect them with Texaco Track Roll Lubricant. It stays in the bearings, seals out dirt and moisture, prolongs bearing life.

For heavy-duty Diesel and gasoline engines, use Texaco Ursa Oil X**. It is fully detergent and dispersive — makes engines last longer, deliver more power, use less fuel.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Old Macadam Road Widened, Surfaced

(Continued from preceding page)

Asphalt Plant

Before the contractor set up his asphalt plant, he first built 900 feet of siding track into the plant site near Doyle from the line of the N. C. & St. L. RR. While the aggregate was supplied from the near-by quarry and crusher and was stockpiled around the plant, the bitumen and fuel oil were shipped by rail from the Hunt Oil Co. at Tuscaloosa, Ala. Delivery usually required four days.

A 13,000-gallon tank near the track held the fuel oil. The bitumen, AC-8 asphalt with a penetration of 85 to 100, was stored in three 10,000-gallon storage tanks just off the siding. Grouped with the storage tanks was a locomotive-type 130-hp oil-fired boiler which furnished steam to heat both the tank cars and the bitumen storage tanks. The steam passed through 1½-inch jacketed lines, and five cars could be heated at the same time.

When the bitumen in the tank cars reached a temperature of around 275 degrees F, a Kinney 4-inch asphalt pump pumped it through a 3-inch line. It went either to the storage tanks or directly to the tank in the plant when the blacktop was being laid. If asphalt was required for the distributor when the plant itself was not running, a Cleaver-Brooks booster, mounted on a truck, unloaded the bitumen from a tank car.

The only thing the plant lacked was water. A couple of well holes were driven at the site but no water was struck. So tank trucks hauled water from near-by Doyle for the boiler.

Path of the Aggregate

At one side of the Simplicity S-75 plant was a long wooden barricade with another fence projecting out from it at right angles on one side. This divided the stockpiles of aggregate which were being used in the mix. A Bay City crane with a 45-foot boom and a Blaw-Knox 1-yard clamshell bucket kept

the aggregate piled up against the barrier so that it flowed down on top of the dual 24-inch feeder. This moved the stone along 20 feet to the bottom of a 20-foot cold elevator. As it reached the top of the cold elevator, the material entered an 8-foot-diameter x 12-foot-long double-shell drier. There the stone was heated by a single Ray burner as it made the double passage within the drier.

The heated stone then ascended a 48-foot-high enclosed hot elevator to a dual rotary screen, 5 feet in diameter x 12 feet long. The top screen had ¾-inch openings, while the lower was equally divided into ¾-inch and 1¼-inch openings. With this arrangement no screen changes were necessary when either binder or top course was being mixed.

From the screens the aggregate fell into three bins: a 20-ton bin for the ¾-inch material, and two 10-ton bins for the ¾ and 1¼-inch stone. The stone and asphalt were weighed out on Kron dial scales, and then dropped into the 2½-ton pugmill where they were mixed

45 seconds. The full cycle from the time the materials entered the pugmill until the hot-mix was dumped in the truck took only one minute.

Three International 18-A 120-hp diesel engines operated the plant. One ran the feeder, cold elevator, and drier; another drove the hot elevator, the screens, and the pugmill; the third powered a Clarage Model 33 exhaust fan at 750 rpm. The fan has a capacity of 25,000 cubic feet of air per minute, and draws fines and dust from the drier through a 30-inch dust line into a dust collector. The material was then delivered to the foot of the hot elevator and went to the bins with the rest of the aggregates. The fumes passed out a 40-foot smokestack.

All the discharge controls, such as the aggregate and asphalt dumps into the pugmill, and the pugmill into the waiting trucks beneath, were steam-operated. The trucks backed under the tower to collect their loads which varied from 8 to 15 tons, depending on the type of truck. Going out of the plant

they were weighed on a Winslow beam scale.

All the hauling on the job was sublet to the Moran Trucking Co. of Knoxville, Tenn. The hot-mix haul was paid for on a tonnage basis. The number of trucks in use varied with the length of the haul; the average haul was 12 miles and the average number of trucks required was 15. Tarpaulins covered the hot-mix along the way, and it was laid at from 250 to 300 degrees F. The plant had a capacity of 150 tons per hour, and usually produced from 1,200 to 1,500 tons per 12-hour working day, 6 days a week.

Laying the Pavement

Out on the road the old surface was first carefully swept clean of dust and dirt by a Grace power broom pulled by a truck. A tack coat of 85-to-100-penetration asphalt was then applied, half the pavement width at a time, at the rate of 0.25 gallon per square yard. If the old surface gave evidence of bleed-

(Concluded on next page)

The Job

The Maine Turnpike

The Equipment

2 Cedarapids Unitized Plants
Cedarapids Model "E"
Asphalt Plant

The Contractor

B. Perini & Sons, Inc.
Framingham, Mass.

200 tons of aggregate per hour...

1,000 tons of top course per day

THE IOWA LINE of Material Handling Equipment

Includes: ROCK AND GRAVEL CRUSHERS • BELT CONVEYORS • STEEL BINS • BUCKET ELEVATORS • VIBRATOR AND REVOLVING SCREENS • STRAIGHT LINE ROCK AND GRAVEL PLANTS • FEEDERS • TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE ASPHALT PLANTS • DRAG SCRAPER TANKS • WASHING PLANTS • TRACTOR-CRUSHER PLANTS • STEEL TRUCKS AND TRAILERS • KUBIT IMPACT BREAKERS

PRODUCING the aggregate and mixing the top course of asphaltic concrete for the south half of the Maine Turnpike was the job assigned to two Cedarapids Unitized Plants and a Cedarapids 4,000 lb. Model "E" bituminous mixing plant. And right on schedule the job was done by the Perini organization.

On job after job, you'll find that contractors who know construction equipment best base their bids on Cedarapids production and get the awards. Whether you need 50 tons of aggregates per hour or 200—or more—there's a Cedarapids plant that will meet your requirements. When it comes to black top there's a Cedarapids bituminous mixing plant to meet the most exacting specifications.

And, best of all, you'll know that you'll get your jobs done on time and make a profit because of their high production, and very low maintenance costs.

On your next job use Cedarapids equipment—you'll be way ahead. When you buy aggregate producing or bituminous mixing equipment—buy the best—buy Cedarapids.

Cedarapids

Built by
IOWA

PRODUCT OF
IOWA

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.



Simplifies DIESEL TROUBLE-SHOOTING

No single factor of Diesel operation is more important than compression pressure. That's why trouble-shooting begins with a check of compression of all cylinders. Model YUF Diesel Compression Tester illustrated has been designed to meet all field and shop needs for an instrument that can take hard use yet give reliable, accurate readings on any make of Diesel engine.

Attachment of tester is by means of interchangeable adapter which takes place of fuel injector. In addition to a "universal adapter" which serves more than 50 makes and types of Diesels, we have a complete line of special adapters for practically every commonly-used Diesel engine. Write for a copy of descriptive Leaflet 605.

ATTENTION! Distributors: Diesel equipment and accessory jobs are invited to write for information about attractive distribution propositions.

BACHARACH INDUSTRIAL INSTRUMENT CO.
7000 BENNETT STREET, PITTSBURGH 8, PA.

ing, the tack coat was omitted. When it was applied, the asphalt was put down at 250 degrees F. A 2,500-gallon supply tank truck furnished the distributor with bitumen on the longer hauls.

Except during the work on the streets of McMinnville, the job was closed to traffic and detours were used. This enabled two Barber-Greene finishing machines to lay the plant-mix. They kept about 100 feet apart, each laying a 12-foot lane; at the end of a day's run they finished with a common joint. Within the city only two courses were used, binder and top; these followed each other in quick succession one day after the other so as to interfere with traffic as little as possible. On the open highway a leveling course, of the same mix as the binder, was put down first wherever it was needed. The binder and top courses followed.

The leveling and binder courses varied from 1 to 1½ and from 2 to 3 inches in thickness, respectively; the top course was a uniform 1½ inches. The total weight of the mix averaged 450 pounds to the square yard—150 pounds for the top and the rest for the lower mix course, or courses as the case might be. On the highway, binder was usually laid for a full day, followed by top course for half the next day to catch up with the full thickness of pavement. Binder work went on for two more half days, and top work for another half day to complete the cycle. Each course was rolled from the outside edge to the center by tandem rollers. There were three of these on the job: an 8 to 10-ton and a 10 to 12-ton Buffalo-Springfield, and an 8 to 10-ton Austin-Western.

The Mix

The gradation of the binder and surface courses is as follows:

Sieve Size	Per Cent Passing	
	Binder	Surface or Top
1½-inch	100	100
¾-inch	55-80	95-100
½-inch	25-40	75-90
No. 4	5-15	45-60
No. 40	5-15	15-30
No. 100	5-15	5-10
Asphalt	4 per cent	5½ per cent

An average force of 60 was employed by the contractor, not counting truck drivers working on the hauling subcontract. Of this number 12 were on the widening operations, 19 on the paving, 13 at the asphalt plant, and the rest on grading. When the paving was completed, the 3 feet of shoulders remaining was shaped up with a pair of Caterpillar motor graders.

Quantities and Personnel

The major items on both contracts included the following:

Items	16.6-Mile Contract	23.6-Mile Contract
Excavation	10,300 cu. yds.	8,310 cu. yds.
Crushed stone (widening)	12,815 tons	14,073 tons
Bitumen, penetration macadam	153,561 gals.	169,121 gals.
Screenings	851 tons	1,055 tons
Tack coat	48,582 gals.	76,139 gals.
Aggregate, plant-mix	43,460 tons	65,068 tons
Bitumen, plant-mix	325,120 gals.	524,020 gals.

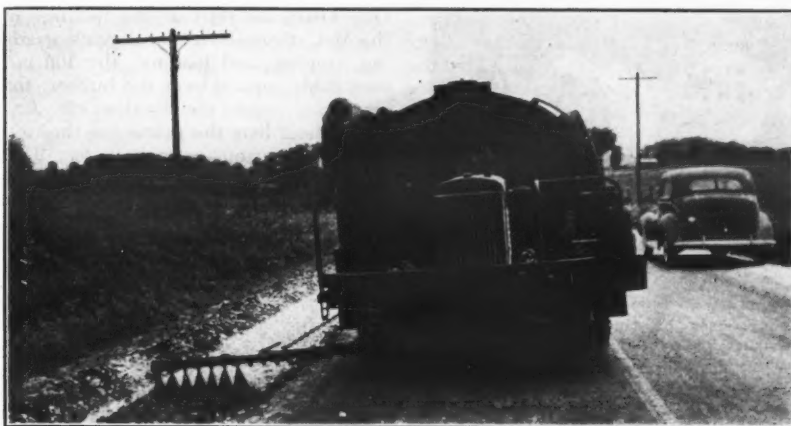
A. C. CURRENT ANYWHERE!

with

KATOLIGHT PLANTS AND GENERATORS

Furnish the same kind of Current as the highlines. Sizes 500 watts to 100 KW. Also manufacturers of Rotary Converters, Frequency Changers, 32 and 110-volt D.C. motors in ¼, ½, and ¾-hp. A.C. motors (high line) in 1½ and 2-hp. only.

KATOLIGHT, 118 MAXFIELD AVENUE, MANKATO, MINN.



C. & E. M. Photo
On a 40.2-mile Tennessee road job, first-course stone in the widening trench receives a coat of asphalt prime which will be covered with choke stone. An Etnyre 1,130-gallon distributor mounted on a GMC truck applies the bitumen through seven jets left open at the end of the spray bar.

For the Wesco Paving Co. the General Superintendent was F. M. Deaver. A. T. McAfee was in charge of the paving and Shorty Darter of the widening

operations. At the asphalt plant D. L. Spears and D. L. Blain were Foreman and Technician respectively. Merle Darter was Office Manager.

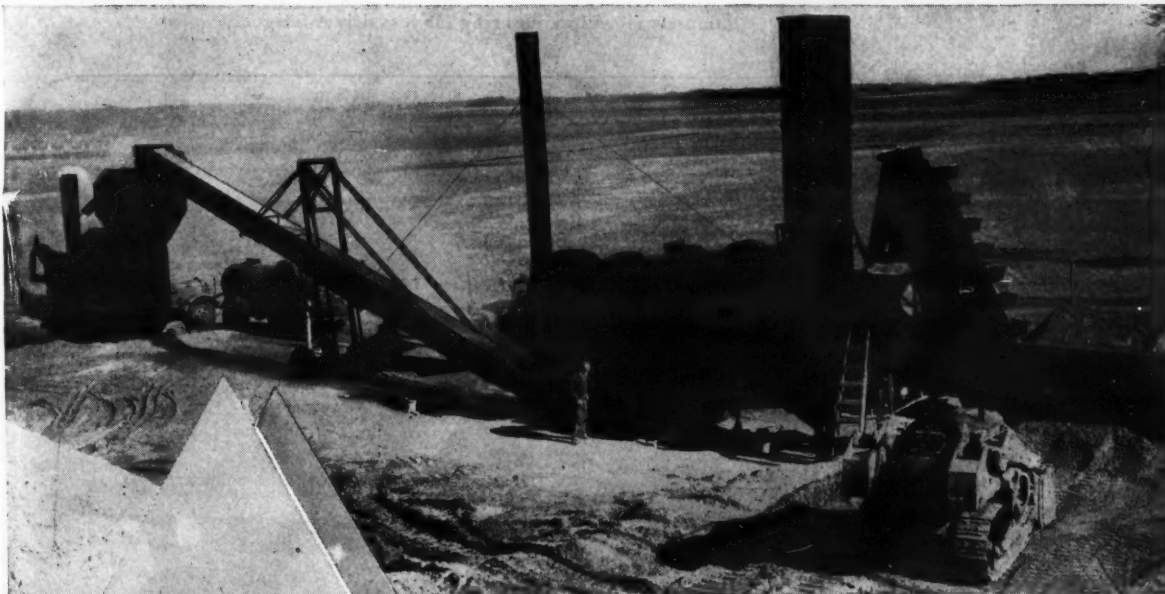
Tom Phy was Resident Engineer for the Tennessee Department of Highways and Public Works. The project is located in Division 2 which is headed by S. M. Squires, Division Engineer, with headquarters at Chattanooga. C. W. Phillips is Commissioner of the Department, with W. T. Brooks as State Highway Engineer. O. F. Goetz is State Construction Engineer.

Link-Belt Sales Offices

The opening of a sales office in Grand Rapids, Mich., has been announced by the Link-Belt Co., Chicago, Ill. The new office will be under the direction of Peter Groustra, formerly District Sales Engineer at Detroit. It is located in the Murray Bldg., 48 Division Ave., North.

Schloss & Shubart, distributor in the Rocky Mountain region, has moved to 1626 Wazee St., Denver 2, Colo. Stocks of popular standard Link-Belt products will be carried at the new address to permit complete on-the-scene warehouse service.

Barber-Greene



High-Capacity

"Intermediate" Mixing with Portability

Here's the B-G "Intermediate" Bituminous Mixing Plant that combines the convenience of true portability with the basic advantages of the B-G Bituminous Mixing System*. You can tow the units you need to the job, right to the spot that's most convenient and economical from the standpoint of aggregate source and need for finished mix.

In its accuracy the B-G "Intermediate" Plant bridges the gap between the B-G "High-type" and B-G Travel Plant. Capacity is from 80 to 120 tons per hour. It is used principally for single-aggregate mixes; however, an optional 2-compartment charging Bin, with B-G 2-gate Reciprocating Feeder, provides a method of feeding a fine and coarse aggregate where rigid aggregate gradation is not required. For details, write for literature, or see your B-G representative.

*THE B-G BITUMINOUS MIXING METHOD: Continuous flow, with measured volumetric aggregate content, metered bitumen supply, controlled temperature, and thorough twin-pugmill mixing—through flexible, coordinated portable units. Barber-Greene Company, Aurora, Illinois.

The B-G Tamping-Leveling Finisher will lay any mix, hot or cold. Places a continuous ridge-free surface with each succeeding strip firmly compacted against the previous one.



BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment



LOADERS

PERMANENT CONVEYORS

PORTABLE CONVEYORS

COAL MACHINES

BITUMINOUS PLANTS

FINISHERS

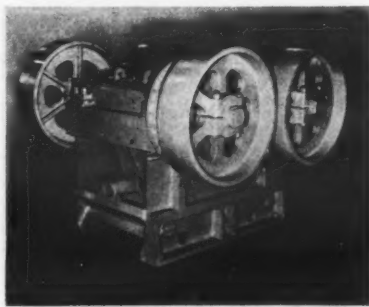
DITCHERS

Twin Movable Jaws Feature New Crusher

A line of jaw crushers featuring two movable jaws, instead of one movable and one stationary, has been brought out by the Iowa Mfg. Co., 916 No. 16th St., Cedar Rapids, Iowa. The twin jaws are operated by two eccentric shafts and a double set of flywheels. This is said to provide increased capacity and smoother operation.

The twin jaw crusher can often be used to do the work of a regular jaw crusher and a roll crusher, the manufacturer explains. These units are especially applicable for use in portable plants because of the reduction in drives and the saving of space by combining lengths, heights, and widths of two crushers into one.

Four sizes of crushers are available: 12 x 16, 16 x 24, 12 x 36, and 18 x 36. According to the manufacturer, this crusher can be used as a primary crusher or as a secondary crusher where there is a high percentage of



Four sizes of this new Cedarapids crusher are available: 12 x 16; 16 x 24; 12 x 36; and 18 x 36.

large-size gravel to crush.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 83.

Tractor-Shovel Catalog

Literature covering specifications and prices for its line of tractor shovels has been prepared by M. P. McCaffrey, Inc., 2121 E. 25th St., Los Angeles 11, Calif.

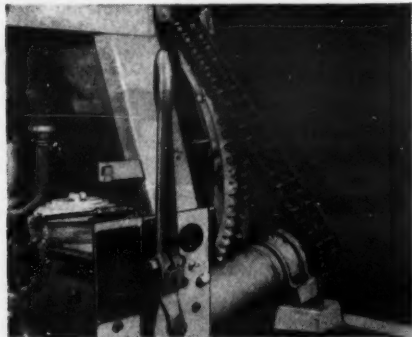
One broadside tells of the features of the McCaffrey shovel for digging, grading, ripping, and loading: the 100 per cent cable control over the bucket; the method of weight distribution; etc. Another sheet lists the prices for the unit and the various attachments. This equipment is made for Caterpillar D4 and D6 tractors, the Allis-Chalmers HD-7W, and the International TD-9.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 74.

Max Berns Dies Suddenly

Max A. Berns, Publicity Manager of the Universal Atlas Cement Co. of New York City, died recently. Mr. Berns had been with the company since 1913.

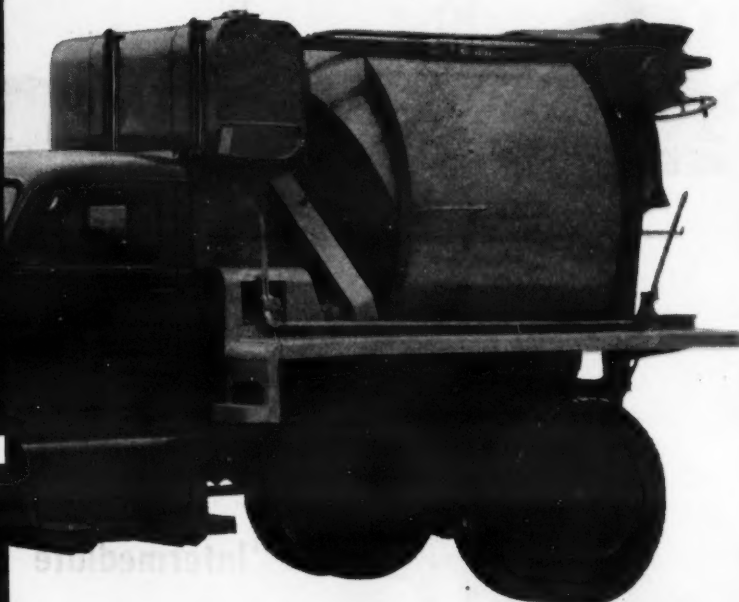
Mr. Berns will be succeeded by Joseph A. Sullivan, formerly Assistant Publicity Manager. In addition to his appointment to the position of Manager, Advertising Bureau, Mr. Sullivan has also been named as Director of Public Relations.



THE CHAIN TAKES THE STRAIN

The exclusive Rex chain drum drive eliminates stresses and strains. The chain protects transmission . . . gears . . . shafting . . . power plant. It eliminates binding between drum and transmission as the truck chassis weaves over uneven ground. The chain effectively dampens vibration, assuring far less driver fatigue.

**Life-Saver
Cost-Saver
Time-Saver
REX
Hi-Discharge
Moto-Mixer**



CHAIN BELT
REX
COMPANY

Lower Maintenance and Operating Cost

The Rex drum drive is a weight-saver. It eliminates the need of bulky, excessively heavy transmission cases, shafting, bearings, etc. This saving in weight here permits Rex to build added strength into parts where it is really needed . . . blades, drum rollers, drum shell and drum support. Here's why Rex gives you lower maintenance costs and assures less operating time.

Time-Saving, Fast Discharge

You'll save minutes every batch with Rex Moto-Mixers. Since Rex mixes in the discharge direction, the batch is always right up at the opening . . . ready to come out in a hurry. Deep spiral scoops speed the batch out *fast!* Remember, it's at the job site where speed is important to avoid holding up your customer's schedules.

For all the facts, see your Rex Distributor or write for Bulletin No. 468.
Chain Belt Company of Milwaukee, 1666 W. Bruce St., Milwaukee 4, Wis.

CONSTRUCTION MACHINERY

Moto-Mixers

Moto-Agitators

Add up

These hard-facing advantages...

- ✓ Excellent Arc Characteristics
- ✓ AC-DC Application
- ✓ No Slag Interference
- ✓ Self-Lifting Slag
- ✓ Solid, Dense Deposits
- ✓ Wide Amperage Range on Welding
- ✓ Rapid Deposition Rate
- ✓ Complete Uniformity
- ✓ Freedom from Moisture Absorption
- ✓ Can be Welded in All Positions
- ✓ Same Hardness and Wear Resistance on Multiple Deposits

It's the NEW COATED STOODY SELF-HARDENING

For maximum wear and impact resistance on heavy equipment.

Available anywhere in the U.S.A.—over 600 convenient dealers. 50c per lb. for $\frac{3}{4}$ " and $\frac{1}{2}$ " rod diameters F.O.B. Whittier or Dealers' Warehouse.

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Chautauque County Highway Dept. Photo
Since 1943, Chautauque County has owned and operated the Bemus Point-Stow ferry which crosses Chautauque Lake. On July 4, 1947, it ferried 1,049 cars and 486 pedestrians.

County Roads

(Continued from page 2)

Galion or Adams pulled grader in tow of a light tractor or one of the big Oshkosh trucks. Caterpillar motor graders do fine-grading. When the job is of some length, shovels and trucks are used for moving the earth.

Road Maintenance

Some of the major maintenance operations completed last year on the surfaced roads totaled nearly 78 miles of improvements, divided as follows:

	Miles
Single surface treatment	41.71
Double surface treatment	13.40
Bituminous retread	13.66
Asphalt retread, 2-inch	11.50
Re-graveling	9.07
Total improved miles	89.34

In the surface-treatment work, a rotary power broom first swept the road clean; then RC-2 asphalt was applied at the rate of 0.3 gallon to the square yard. Two county distributors were available for the work: a 1,200-gallon Etnyre mounted on a White truck, and a 1,000-gallon shop-made unit on an Oshkosh truck. Either stone or slag was used for the cover coat, laid with spreader boxes at the rate of 25 to 35 pounds per square yard. The aggregate was graded from $\frac{3}{4}$ -inch down, and was rolled into the bitumen with both tandem and 3-wheel Buffalo-Springfield rollers. With the double seal, another application of RC-2 was made at the rate of 0.1 to 0.15 gallon, and was followed by a sand cover, 12 to 15 pounds to the square yard. The sand was likewise rolled.

In doing the bituminous retread work, a $2\frac{1}{2}$ -inch layer of $\frac{3}{4}$ -inch-down stone was first spread across the full width of the road by three motor graders with 12-foot blades—a Caterpillar, Warco, and Galion. This course was then shot with 1.3 gallons to the square yard of either RC-2 or RC-3. The graders moved the asphalt-coated stone from half the width of the road and piled it up in a windrow down the other half. The bare half was next given a prime coat of 0.15 gallon of RC-2, after which all the stone was bladed over on top of it. The other half of the road was then primed in like manner.

Mixing followed, with the graders moving the coated stone back and forth the full width of the road from 10 to 15 times until all the stone was covered with bitumen. After a wait of from 1 to 2 hours for the mix to set up properly, it was rolled by both 3-wheel and tandem rollers. The final touch was to chink the voids with sand distributed from spreader boxes. For best results, only from 1,000 to 2,000 feet of retread was done at a time.

On the re-graveling, either creek or run-of-bank gravel was used. The loading was done with any of the three county shovels—a Marion $1\frac{1}{4}$ -yard, a P&H $\frac{3}{4}$ -yard, or a Bucyrus-Erie 1-yard steam shovel. Up to 20 trucks took care of hauling, and the gravel was put down through shop-made spreader boxes in two 6-inch courses. Jobs were started

at the end nearest to the source of supply so that the trucks always ran over the gravel layer, thus aiding in the compaction. Motor graders shaped up the courses, and a York rake was pulled over the surface to throw the larger stones off to the side. The fine-grading was done with an Adams maintainer. Usually no compaction with rollers was required.

Roadside Park

This year the County built its first roadside park at the intersection of State Route 430 and County Route 302, not far from Sherman. The plot of ground is small, about 100 feet square, but it contains a parking field which is adjacent to the road and is paved with bank-run gravel. Wooden guard posts separate it from the rest of the area which has been covered with a layer of topsoil and seeded with grass. Some trees and shrubs have been planted, and two picnic tables with benches have been set out for the convenience of the traveling public.

County Ferry

Since 1943 the County has owned and operated the Bemus Point-Stow ferry which crosses the 22-mile-long Chautauque Lake at its mid-point. The lake has an extreme width of 3 miles, but at the ferry-crossing a jutting peninsula shortens this distance to less than 1,000 feet. The ferry is a landmark in the county, for it began operations back in 1811 and was operated by private in-

terests until the County purchased and reconditioned it. Farmers in the large dairy section on the western slope back from Stow save considerable time and mileage crossing the ferry to Bemus Point where feed for their stock comes in by rail. Summer visitors use it for a short cut, as it saves 10 miles of driving en route to Buffalo from the western shore of the lake.

(Concluded on next page, Col. 2)

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Among LaPlant-Choate's new hydraulic products—pumps, motors, valves, cylinders, etc.—is this power unit which incorporates in one design a pump, control valve, and reservoir.

New Hydraulic Units For Road Machinery

A new line of hydraulic products is offered to the construction industry by the LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa. The manufacturer recommends the line for use on many different types of highway equipment, such as dump trucks, snow plows, wagons, excavators, power saws, conveyors, hoists, and all similar types of machinery. Included in it are hydraulic pumps, motors, valves, cylinders, and a 3-in-1 power unit incorporating in one design a pump, control valve, and reservoir.

The pumps, motors, and power units are available in four sizes: 15, 25, 40, and 60 gpm. The cylinders are available in three sizes: 4, 5, and 6-inch diameters. Valves are made in two sizes, to control flows of up to 50 gpm, and up to 70 gpm.

Features advanced for the pumps and motors include interchangeable spur-type gears, needle roller bearings, positive lubrication, and bronze reversible thrust plates. The pumps are designed for automotive, portable, or stationary installations; they may be electric-motor or engine-driven. The power unit is said to have surge control, a supercharged pump, and a small-capacity reservoir. Valves are of the spool type, three positions (float position optional), and self-centering; they may be had with or without automatic surge control. The cylinders are double-acting and designed to be mounted in any position. Pistons are of the ring type for high-pressure sealing and have chrome-plated piston rods.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 14.

Hand Shovel Data

A tool found on almost all construction jobs is the hand shovel. But the care and skill required in its manufacture is often forgotten. A catalog on this subject has been prepared for distribution by The Wood Shovel & Tool Co., Piqua, Ohio. Feature of the Wood Moly line of shovels is the use of molybdenum steel in all blades.

The catalog discusses in detail the features and physical characteristics of this steel—hardness, ductility, strength, lightness, and uniformity. It also tells of the care in the selection of wood for the shovel handles. These are made of northern white ash selected for grain, weight, color, texture, and growth. Another feature of the shovels is the I-beam type of handle reinforcement.

Catalog H gives sizes, weights, and other specifications for all units in the Moly line. These include long and short-handle shovels, spades, and scoops to fit most purposes.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 81.

County Roads

(Continued from preceding page)

It normally operates from March until late in December when the closing ice becomes too thick for the ferry to cut a swath across it. Its biggest day was on July 4 last year when 1,049 cars were ferried across, together with 486 pedestrians. Up to and including Labor Day week last year, over 54,000 vehicles and over 10,000 pedestrians were carried. The rate for passenger cars with occupants is 25 cents for a one-way passage; pedestrians are charged 5 cents.

Carrying nine cars at a crossing, the ferry makes a trip in 3½ minutes. Its motive power is a Sheppard 31-hp diesel engine which turns the two paddle wheels. The boat is kept on its course by two ¾-inch guide cables, each 950 feet long, anchored to deadmen on each shore.

W. Bruce Chilson is County Superintendent of Highways with headquarters at Falconer. Elvera Anderson is Secretary to the Department. Raymond D.

Borthwick is Chairman of the Chautauqua County Highway Committee.

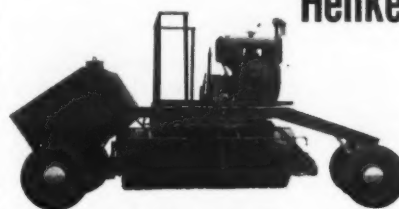
Data on Post-Hole Digger

A broadside describing its Continental post-hole digger has been put out by the Equipment Sales Co., 205 Gay Bldg., Madison, Wis. It gives the complete story of this unit, said to dig perpendicular or angle holes up to 48 inches

deep and from 4 to 14 inches in diameter.

The broadside contains photographs of the unit in various positions, and contains complete specifications of this Model C post-hole digger. Descriptive text tells what the unit can do and the features claimed for it.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 52.



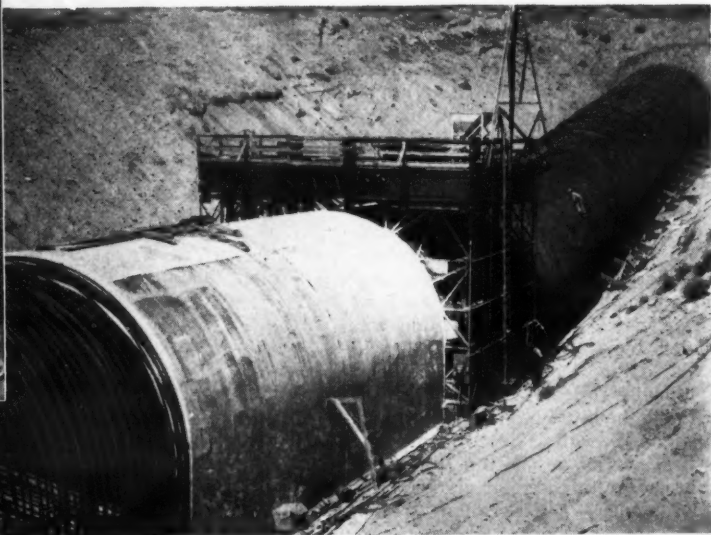
Write for details.

Henke Rotary Power Sweeper

Designed for sweeping bituminous roads before retreatment, and removing excess screenings from base courses prior to surfacing. Also used in street sweeping and snow removal. 7 and 10 ft. sweepers available with patented full circle swing and 56 in. tread. 10 ft. sweeper consists of two 5 ft. oscillating cores.

HENKE MFG. CORP., Janesville, Iowa

30-ton Steel Form moved by CP Utility Winches



On the Columbia River Basin Project two huge concrete siphons are under construction. The reinforced concrete shell, 25 feet in diameter, two feet thick, is poured in a 60,000-pound movable steel form which straddles the siphon and runs on tracks. Two CP Air Winches pull the form from section to section, spotting it accurately at each location.

Powered with air, electric or gasoline motors, CP Utility Winches have a wide range of applications—single or multiple line hoisting... spotting cars... handling timber... erecting machines, boilers, structural steel, etc.

Precision control of the CP Utility Winch is provided through clutch and brake levers. The clutch lever enables the operator to vary drum speed, and "tease" the load by hauling it in, holding it momentarily or paying it out. To increase the versatility of the CP Utility Winch, a combination cathead and drum arrangement can be furnished. Write for Bulletin SP-2057.



Whenever air demand slackens, the engine speed of fuel-thrifty CP Portable Compressors is correspondingly reduced by automatic action of the CP Gradual Speed Regulator. This and other CP features effect fuel savings of 15% to 35%.

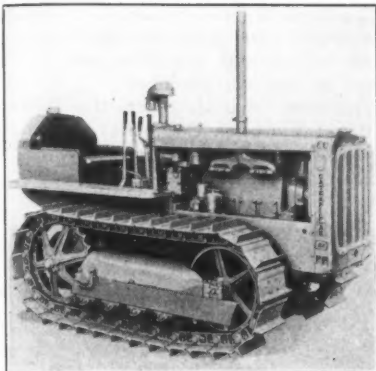
CP gasoline-driven compressors range in capacity from 60 to 315 c.f.m.; Diesel-driven from 105 to 500 c.f.m. Write for complete information.



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The new Caterpillar D2 tractor is powered by the new Caterpillar D311 diesel engine. Its maximum drawbar hp is 32; its maximum belt hp is 38.

Track-Type Tractor Develops 38 Belt Hp

A new track-type tractor listed at 32 drawbar hp and 38 belt hp has been announced by the Caterpillar Tractor Co., Peoria 8, Ill. Power for this D2 tractor is furnished by the new Caterpillar D311 diesel engine. It is said to attain speeds of 5.1 mph in fifth gear, and 2.1 mph in reverse.

The manufacturer states that the rated drawbar pull in first gear, based on tests, is 6,250 pounds, with varying degrees to 1,960 pounds in fifth gear. Length of tracks on the ground measured from the center drive sprocket to the center front idler is 4 feet 6½ inches. Area of ground contact, using the 12-inch track shoes, is 1,308 square inches. Overall length is 8 feet 11½ inches; height is 4 feet 9¾ inches; and ground clearance from the lower face of the standard track shoe is 9 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 79.

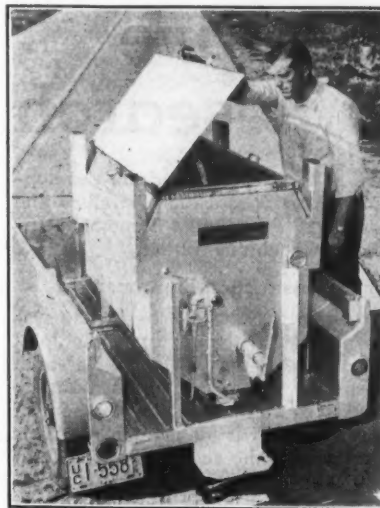
Rubber Joint Sealer; Special Melting Kettle

A rubber-resin joint-sealing compound and a kettle for melting it have completed their field tests and are now ready for distribution by the United States Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. The compound is known as Sealz, and the kettle is called the Sealz-Melter. It is said that Sealz will stretch in winter and compress in summer without breaking and without separating from the concrete.

The Sealz-Melter kettle works on the double-boiler principle in order to melt the compound without burning the rubber in it. The inner chamber is separated from the outer chamber by a bath of oil; according to the manufacturer, this can be brought up to a temperature of 450 degrees F within an hour and a half. The kettle will accommodate 50-pound slabs of Sealz without cutting. It works on a continuous cycle, 50 pounds being added and withdrawn every 12 minutes.

Heat for the unit is obtained by burning gas from a pressure cylinder. Temperature is controlled by an automatic regulator. Constant agitation of the material being melted is obtained by a stirrer driven by a gasoline engine. Melted Sealz is withdrawn through an insulated valve seated in the oil-bath chamber. The machine is 3 feet 6 inches high x 3 feet 7 inches long x 27 inches wide. Total weight is 1,150 pounds.

Another piece of equipment in the Sealz team is a specially designed melting pot. It has a rubber nose said to



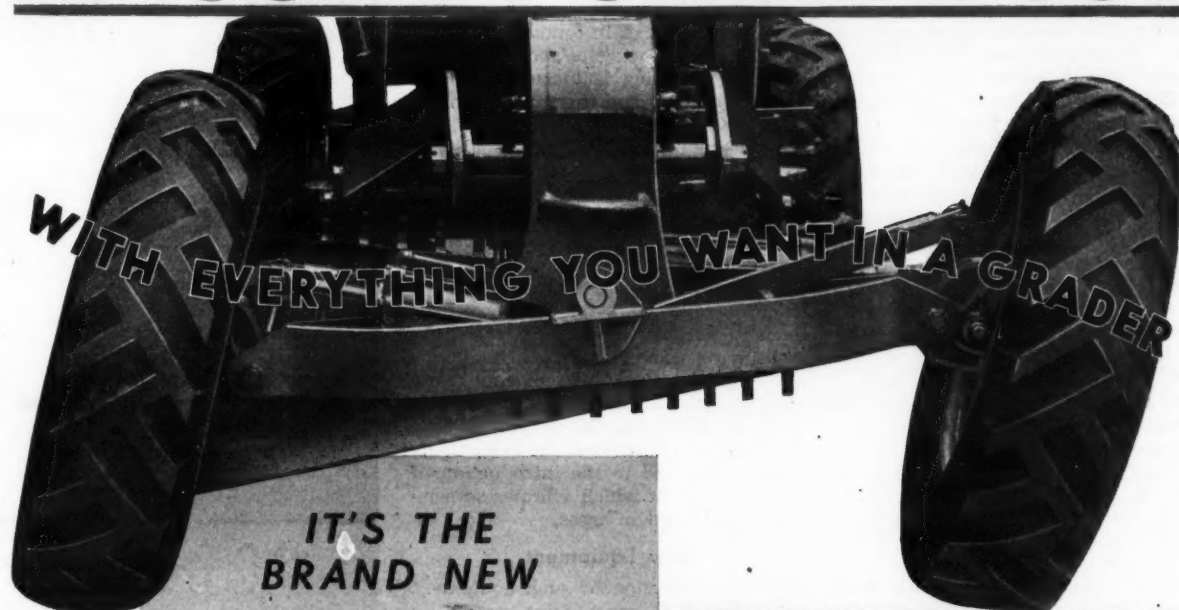
To melt and pour its new rubber-resin joint-filling compound called Sealz, U. S. Rubber Co. developed the Sealz-Melter unit and a special pouring pot, shown at left and right respectively.

wipe the surface smooth when it is dragged along the concrete joint. This feature is said to cut down on spoiling and waste, and to permit an inexperi-

enced man to lay a smooth, clean joint.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 12.

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WITH EVERYTHING YOU WANT IN A GRADER

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MODEL D-76 WARCO MOTOR GRADER

It's the BIGGEST! . . . THE HEAVIEST! . . . THE MOST POWERFUL! . . . yet the easiest-handling Motor Grader we've ever built. This MASSIVE POWERHOUSE . . . the brand-new Model D-76 . . . is designed to on-the-job requirements, has everything you want in a motor grader. If you don't know your WARCO dealer, write today sure . . . you'll want to see this soft-spoken . . . yet hard-hitting baby in action, and learn all the facts!

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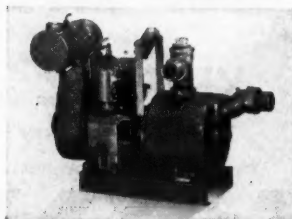
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Performance—Stability—Economy—three words which embody the CARTER tradition for producing the best! Every buyer knows that it's experience which counts. You, the customer, know that only a well-trying and proven product can be relied on to do the job.

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*Write for Bulletin 4503

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HRB Holds Conclave On Highway Research

Nearly 850 Attend 27th Annual Meeting of the Highway Research Board In Washington, D. C.

NEARLY 850 delegates and others actively interested in the technical features of highway construction and use attended the 27th annual meeting of the Highway Research Board held in Washington, D. C., from December 2-5, 1947. During the four-day conference in the National Academy of Sciences Building, 24 different sessions were conducted in morning, afternoon, and evening assemblies. All these sessions, except for one general meeting, covered specific research projects in the highway field.

At the general meeting Dr. Detlev W. Bronk, Chairman of the National Research Council, welcomed the delegates, and Roger L. Morrison, Chairman of the Highway Research Board, gave the annual address. Professor Morrison then presented the Highway Research Board Award for the outstanding technical paper that was given at last year's meeting. The winning paper was entitled "Airport Runway Evaluation in Canada" and its author is Dr. Norman W. McLeod, consultant to the Department of Transport in Canada.

The paper describes the procedures used in evaluating several Canadian airports. It also presents carefully derived formulae for the design of airports and highways of the future to withstand the tremendous loads imposed by modern transport planes and trucks. The paper, incidentally, was the longest of the 70 which were given consideration for the award by the committee of three.

The pros and cons for the use of polarized headlights were also discussed at this same general meeting by Dr. Edwin H. Land, President of the Polaroid Corp., V. J. Roper of the General Electric Co., and J. H. Hunt of the Automobile Manufacturers Association.

Over 125 papers and reports were presented during the 24 sessions. They covered such highway subjects as design, maintenance, construction, mate-

rials, soils, parking, roadside development, land acquisition, traffic and operations, planning, economics, finance, and administration.

Construction Equipment

The delegates at the construction session also heard the report of the Joint Committee of the Highway Research Board and the American Road Builders' Association on the development of highway construction equipment. This report told of the activities of the Joint Committee at the three previous meetings that were held when engineers, contractors, and representatives of equipment manufacturers got together for a discussion of their mutual problems.

A need was expressed for power-driven boring equipment, or earth augers, specifically designed for highway work. Equipment now in use for this purpose was built for work in other fields, and is not light enough or mobile enough to be used to best advantage on roads, the report stated. For highway use, rigs should be available for taking undisturbed samples from borings to depths of 100 feet in foundation investigations. Other augers should be constructed to bring soil samples to the surface quickly and easily when boring to bedrock. A third application mentioned was for drilling holes to average depths of 10 feet for sampling base courses and subgrades on existing roads, so they can be studied before highway-reconstruction plans are prepared.

The report also mentioned the preference of contractors for machines over men to perform a job quicker, better, and more economically. In the construction of macadam pavements, manpower is possibly more in evidence than in most other types of pavement. This fact and the activities of the Joint Committee have led to the introduction of new equipment which vibrates screenings into macadam bases.

New Equipment

The introduction of such equipment was described in a joint paper by Charles W. Allen and S. O. Linzell, Re-

search Engineers for the Ohio Department of Highways. Two manufacturers, each with a different approach to the problem, have developed machines to place screenings in base courses. The Buffalo-Springfield Roller Co. has built a 3-axle tandem roller whose center

roll acts as an idler which vibrates at the rate of 3,600 pulsations per minute. Thus rolling and vibrations are combined in the one machine.

The other manufacturer, the International Vibration Co., believed in the

(Concluded on next page)

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- **FAST** Specially designed cutting blade and dies produce fast cutting action. The hammer principle eliminates any special skill requirements.
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- **PORTABLE** Model for tool kit or stationary operation. With cutting capacities up to: 1 inch, 1 1/16 inch, 1 1/2 inch.

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The three illustrations to the right are typical combinations of VIBER'S interchangeable units.

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6', 12' and 21' lengths

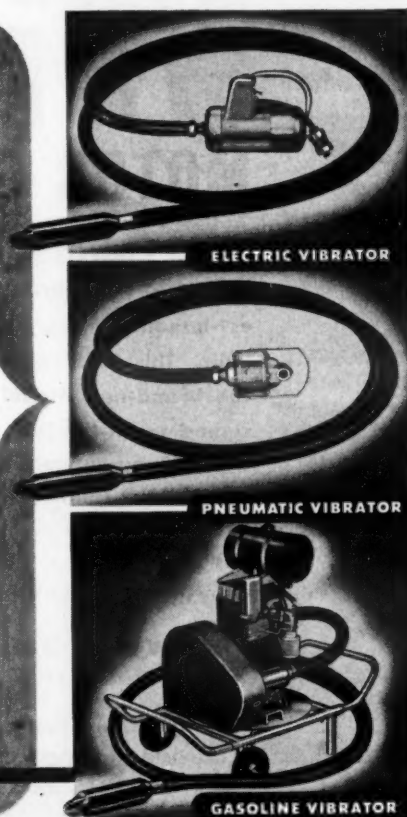


VIBRATOR HEADS
1 1/4", 2 1/4" and 3" diameter



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application of vibration by a machine designed solely for this purpose. The machine consists of a crawler-propelled frame which moves a battery of six vibrating shoes over the course. The shoes vibrate at the rate of 2,800 pulsations per minute.

Before making these machines available to the public, both manufacturers gave private demonstrations at which the engineers were invited to give their criticisms. As a result, some changes were made, and then the machines were put to work on regular highway jobs. They were considered to be remarkably efficient in the placing of screenings, but the vibration is said to be of questionable value in keying the coarse aggregate.

Jacking Pipe

Another paper received with interest by construction and soils engineers was "Jacked-in-Place Drainage Pipe" by Jacob Feld, New York Consulting Engineer. Engineer Feld described the methods used in jacking pipes of all diameters under highway fills, and recommended this method of pipe installation where wide paved roads were involved. He observed that railroads do not permit open cutting through their fills, and that highway departments should act in like manner. Jacking a pipe costs no more than open cuts on a really big job, he maintained; moreover, the pavement is left undisturbed, no traffic is interrupted, and the bump which results from backfilling is eliminated.

In the discussion that followed, the method of boring with tunnel liner plates was also reviewed, and the subject switched to big tunnels constructed with shields. One delegate then offered the information that he had been interested in preparing a paper on tunnel construction, and wished to include a table of data on shield sleeves with accompanying information on depths, soils, pressures required, etc. When he inquired at the office of the New York City Board of Transportation for its charts and notes covering tunnel-shield sleeves, he learned that during the war all such data on subway construction was sacrificed to the scrap-paper drive.

Roadside Development

Reports were presented by the three divisions of the Roadside Development Committee. They covered design, right-of-way and border control, roadside construction and maintenance, specifications, education and publications. The use and advantages of aerial photos and airview studies in highway work were discussed. Also, the studies of various mulching methods now under way were described, and it was announced that they will be continued.

The subject given most attention was that of stabilized turf shoulders. Experimental work in New York, New Jersey, and Michigan was reported in detail. The U. S. Engineers' experience in the development of satisfactory turf on stabilized soils at airfields was also described.

Contractors Use Soil Maps

One of the concluding papers of the meeting was presented by Earl F. Bennett and G. W. McAlpin, Soils Engineers of the New York State Department of Public Works. It was titled "An Engineering Grouping of New York State Soils". By means of soil maps that the Department has prepared, the most suitable alignment is selected according to the best natural foundation material, and the cost of construction is materially reduced. Boring sites are also laid out to better advantage with these maps.

The soils engineers work closely with the design engineers, and before any contracts are awarded the adequacy of the soil is always fully determined. In this way any job difficulties can usually be foreseen regarding earth-work

quantities, base-course material, drainage, etc. Contractors have learned to take advantage of these soil maps in locating borrow pits, and also in planning their earth-moving operations according to the type of material they can see they will encounter.

Portable Conveyors

A line of portable belt conveyors is made by the Trowbridge Conveyor Co., 854 Van Houten Ave., Clifton, N. J. This company makes troughed or flat-belt conveyors. It recommends the troughed belt conveyors for handling sand, gravel, crushed stone, and similar abrasive materials. It recommends the flat-belt conveyors for handling non-abrasive materials.

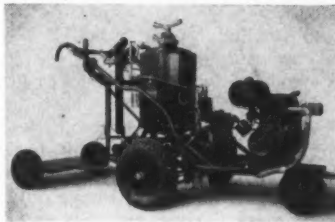
The troughed conveyors are made with 18 and 24-inch-wide belts, in lengths varying at 5-foot intervals from 20 to 60 feet. The flat-belt units are made with 14 and 18-inch-wide belts, in the same lengths.

The troughing rollers are of the 3-

pulley type for 24-inch-wide belts, and of the 2-pulley type for the 18-inch-wide units. A special winch-type raising and lowering device is said to provide a wide range of elevations. A special Hi-Lo carriage for even greater range of elevation can be furnished at

extra cost. The belt is a Trowbridge-brand rubber belt, 4-ply, 28-ounce duck. Power can be furnished by electric motor or gasoline engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 27.



All-Purpose Striper Solves Zone-Marking Problem

Self-propelled and completely self-contained, designed to meet the needs of state and county highway departments, municipalities and airports for accurate high speed striping.

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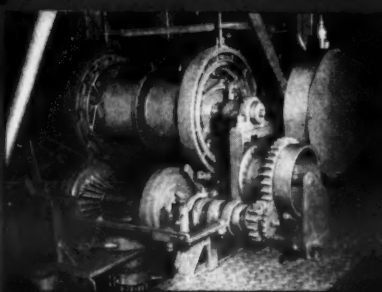
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The "HEART OF THE BANTAM"

The simplest machine made

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Long Piles Driven For Lock Foundation

Timber Piles, 72-78 Feet, Are Driven Under Water to Support Concrete Lock for Navigation Through Levee

✦ A CONCRETE lock is now being constructed in the East Atchafalaya Basin protection levee in southern Louisiana. It will permit uninterrupted navigation between the Mississippi River, east of the levee, and the Intracoastal Waterway lying west of the levee. Fir piles, 72 to 78 feet in length, have been submarine-driven to provide a foundation for the new lock which will be completed this year. The work is being done by R. Thos. McDermott & Co., Inc., of New Orleans, La., under contract to the U. S. Engineers, New Orleans District. It will cost approximately \$1,250,000.

When the lock is completed, boat traffic may leave the Mississippi River through the lock at Plaquemine on the right bank, then via Bayou Plaquemine and Lower Grand River, it will reach the new lock located at Bayou Sorrel, 15 miles below Plaquemine. After passing through this structure, vessels may continue their passage through the borrow pit of the East Atchafalaya Basin protection levee to the Gulf Intracoastal Waterway via Morgan City, La.

Intracoastal traffic formerly effected passage from the east to the west side of the levee through a gap in it at Bayou Pigeon, 8 miles below the site of the new lock. This was the only opening in it between Morgan City, 30 miles to the south, and Morganza, 60 miles north. But high stages of water in the Atchafalaya Floodway necessitated emergency closure of this opening in 1945 and again in April of 1947.

An alternate waterway has been provided and is nearing completion to the east of this levee. This route, which is 20 miles longer than that formerly in use, takes advantage of natural waterways for most of its distance; dredging has been required principally to provide adequate channel dimensions. While this alternate route may serve satisfactorily for traffic which originates near or would otherwise run through Morgan City, it increases by 100 miles

the length of run for all traffic which originates in the floodway west of and north of the new Sorrel Lock.

Although called Bayou Sorrel Lock, the new concrete structure connecting Atchafalaya Floodway with the Lower Grand River is really only a floodgate in its present stage of development. Because of a shortage of funds, only half a lock can be built at this time. This means that the structure will have only one set of gates.

These gates will be left open except when a high-water stage occurs in the Floodway. Then they will have to be closed, shutting down navigation through the levee. If more funds become available, the other half of the structure can be built. With two sets of gates and a lock between, navigation

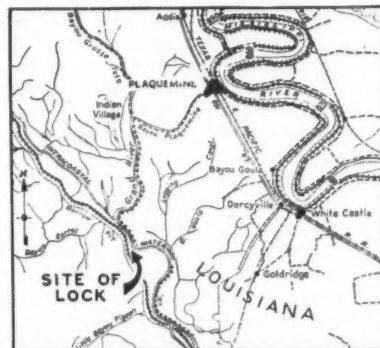
through the levee will be assured even if the Floodway is at high water.

First Site

Actually the lock is being constructed not in the levee but at a point to the east between Lower Grand River and the levee. Connecting earth levees are being built to tie the main levee into the sides of the new concrete structure. Approach channels also have to be dredged on the north, from where Lower Grand River makes a big bend, to connect the river with the lock, and on the south from the lock to the levee. The lock and the approach channels lie nearly due north and south.

The original site chosen for the lock lies about 1,500 feet north of the present construction, but when foundation difficulties were encountered the site was shifted to the present location.

The original plan was first to excavate for the foundation and then drive the piles, all work to be done in the dry. To accomplish this, shallow flotation channels were dug in the flat low-lying



As this map shows, Bayou Sorrel Lock will permit boat traffic from the Mississippi and the Lower Grand River to pass through the East Atchafalaya Basin protection levee to the Gulf Intracoastal Waterway via Morgan City.

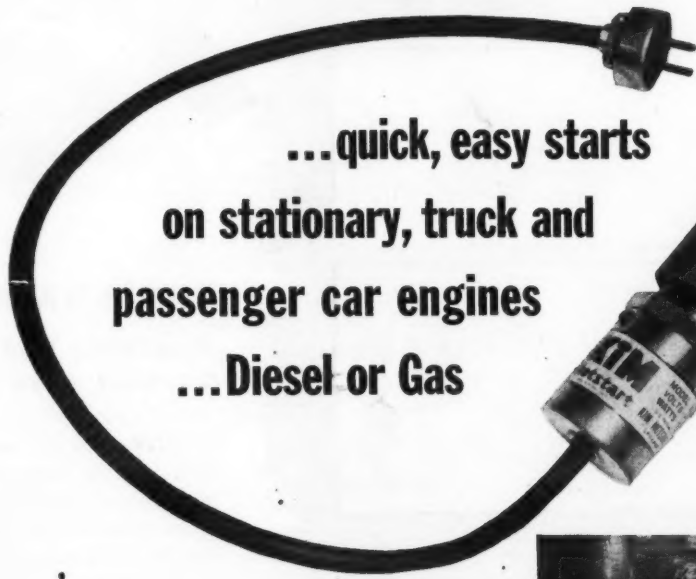
land on both sides of the site and connected to Grand River. Then the clam-shell dredge Conical, belonging to the Sternberg Dredging Co. of St. Louis, was engaged to excavate the site by

(Continued on next page)

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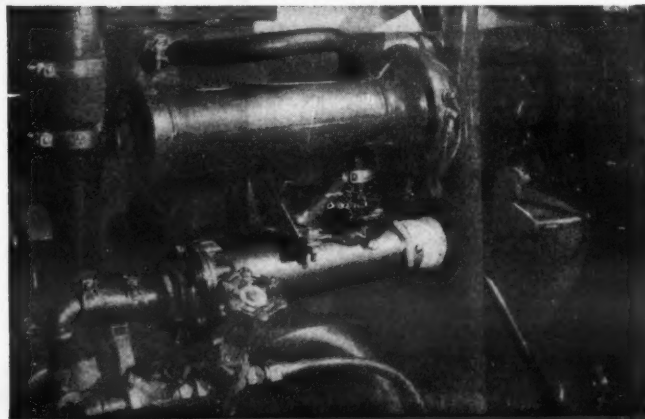
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C. & E. M. Photo

A McKiernan-Terry double-acting 9B2 hammer drives 72 to 78-foot fir piles under water for the Bayou Sorrel Lock foundation. R. Thos. McDermott & Co. used this rig on its \$1,250,000 contract with the U. S. Engineers.

working from the flotation channels on either side. This was possible because of the remarkable 240-foot length of boom on the Conical, which is equipped with a 6-yard clamshell bucket.

After locking itself up into the flotation channels, it began operations in April, 1946. The material that was excavated from the site was piled to the outside of the channels. By July the structure excavation was about 95 per cent complete. But then failures occurred on both the east and west sides between the flotation channels and the site. With the banks caving in, work was immediately suspended, the Conical was withdrawn in time back to the river, and the site was subsequently abandoned.

Extensive borings were then made in an investigation of the present site. This time it was decided both to excavate the site and to drive the piles under water. Accordingly a subcontract was let to the McWilliams Dredging Co. of New Orleans, La., to excavate the site and also the north approach channel by hydraulic dredging. Early in November the suction dredge Natchez, starting from a point in the river near the site of the old excavation, worked its way southward and completed the channel and new structure excavation by January 1, 1947.

Most of the material thus excavated was used to construct a levee south of the structure site, which will connect the east side of the gate bay with the existing floodway levee. Prior to hydraulic dredging, a dragline was used to excavate a minimum access channel at the north end of the structure excavation site. Spoil from this was placed on both sides for use in plugging this opening for unwatering operations.

Pile Driving

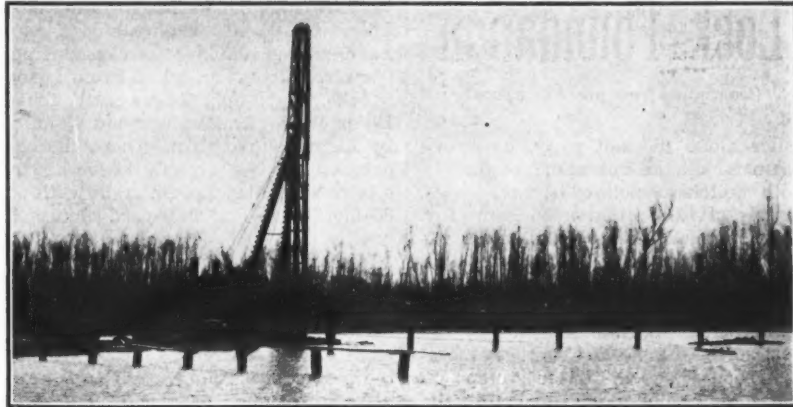
The dimensions of the lock as it is being constructed are 232 feet north and south x 135 feet east and west. Altogether 894 fir piles, 72 to 78 feet long, were required as a foundation for the

structure. They have 6-inch-minimum tips and 12 to 14-inch butts.

Timber was obtained from the forests of Washington and Oregon, and shipped by rail to a siding of the Texas & Pacific railroad at Indian Village, La., near the junction of Bayou Plaquemine and Bayou Grosse Tête. There it was unloaded, made up into rafts, and floated 10 miles down the river to the job site.

Driving was done with the No. 2 rig. This consists of a steel barge 65 x 26 x 6 feet deep with a wood deck, at the bow end of which is a 75-foot A-frame supporting 100-foot telescoping steel leads. The telescoping 6-inch pipe within the leads permitted the piles to be driven to within 1 foot of the bottom of the excavation, which at the deepest part is covered with 29 feet of water.

Working in the leads was a McKiernan-Terry double-acting 9B2 hammer which has a length of 6 feet 11 inches and a total weight of 6,780 pounds. The weight of the striking part is 1,500 pounds, while the normal stroke of the



C. & E. M. Photo

This view from the shore shows the McDermott No. 2 pile-driving rig. The batter piles sticking out of the water acted as guides to spot lock-foundation piles.

ram is 1.33 feet. It produces 140 strokes per minute developing 8,200 foot-pounds of energy per blow. The base of the ram cylinder has a diameter of 8½ inches.

Steam was supplied by two Lambert

vertical boilers located at the stern of the driver. They were fired by oil and their combined 40 and 30 hp was generally used in unison. Although each could be hooked up separately, one

(Continued on next page)



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Lock Foundation

(Continued from preceding page)

boiler alone did not produce enough steam for all the operations of the rig. Both boilers consumed from 6 to 10 barrels of fuel oil in a 10-hour day. They supplied steam to a Lambert 3-drum hoist which lifted the piles with one line, the hammer with another, and the telescoping leads with the third.

The driver could be moved east and west across the site on 300 feet of 1 1/4-inch rope attached to tree stumps on the opposite shores, and hooked to the niggerhead on the steam hoist. The north-south lead lines were 3/4-inch steel cables, also 300 feet long each. The north lead line was attached to a 1,500-pound anchor while the south lead was fastened to a stump on shore. An American 2-drum hoist powered by an International Model U-9 gasoline engine operated the north-south lead lines.

The piles were driven on approximately 5-foot centers, beginning at the center and working towards the ends and sides of the site to eliminate any uplift or pocketing on the bottom of the excavation. To spot the piles precisely, two rows of guide piles were driven with their tops left projecting from the water. One row ran east and west across the center of the excavation; the other ran north and south on a line out beyond the eastern limits of the site. The guide piles were driven on 17-foot centers and capped with double 2 x 10's for batter boards. Two tapes were used, one from each row of batter boards, to spot the piles in their exact location.

From the rafts moored alongside the driver, the piles were picked up with a slip hook in the 3/4-inch cable to which a chain was attached. When water level was reached in the driving, compressed air was provided by means of a 3/4-inch air hose attached to the hammer, in order to keep water out of the plunger. A Worthington 315-cfm compressor furnished the air for the submarine driving. A 3-inch exhaust hose ran from the hammer to a near-by floating buoy. Driving of the foundation piles was started the latter part of January and was completed in April, 1947.

An earth plug was then placed across the access channel at the north entrance to the structure site, and the water surface elevation in it was lowered to -10 mean sea level. The same equipment was then employed to place and drive that portion of the steel sheet pile cut-off walls which are to be imbedded in concrete. Piling used was of M-115 and Z-32 section varying from 16 to 37 feet in length.

Concrete Batch Plant

While the pile driving was going on, a concrete batch plant was set up along the east bank of the north approach channel. A timber bulkhead 100 feet long was constructed first by driving 50-foot piles on 6-foot centers at the edge of the water, laying posts horizontally behind the piles, and then filling in behind the posts. A solid foundation was required for each of the two big Ransome 2-yard mixers, so the No. 2 rig drove 17 piles, 50 feet long with 8-inch tips and 12-inch butts, on 3-foot centers both ways under each mixer base. Then a 6 x 20-foot reinforced-concrete slab, 30 inches thick, was poured on top of each pile pattern.

Foundations of comparable strength were also constructed for the Johnson 135-ton aggregate bin, and for the Hep-install 2,000-barrel cement silo. A Rex 1/2-yard mixer was used in the concreting operations for the batch-plant foundation slabs.

Materials used in the lock construction include Lone Star bulk cement which is shipped from New Orleans, La., to the siding of the Texas & Pacific railroad at Indian Village; from

there it is hauled 10 miles to the batch plant in special cement-tank trucks. Sand and gravel are purchased from commercial pits located on Profit Island in the Mississippi River just above Baton Rouge, and transported 55 miles by barge to the plant. There the aggregate is loaded directly to the bin by a barge-mounted Lorain crane with an 80-foot boom and a 2-yard clamshell bucket.

Water for the concrete is pumped directly from the channel to the mixers. Reinforcing steel and the sheet piling came from the Sheffield Steel Corp. plant at Houston, Texas, by barge over the Intracoastal Waterway.

As a protection against floods on the Lower Grand River, the work area, including the offices and shops of the

contractor and the U. S. Engineers, was surrounded by a 5-foot-high levee. This was thrown up by a Northwest 3-yard dragline with a 70-foot boom. The contractor also had to build a temporary work bridge across the river, as the parish road runs down the east bank and the job site is on the west side of the river. The bridge consists of pontoon approaches with a barge at the center which is swung open by a Ford-powered winch to permit boats to pass through.

Concrete Lock

After pile driving was completed, the site was refilled with water and the equipment floated out. Following this, the access channel was again plugged and unwatering was begun by one 4-

inch and two 6-inch Rex pumps. To guard against slides, slips, and faults, the unwatering was done very gradually: 2 feet per day for the first five days, then 1 foot per day until the water was all pumped out.

Next, the piling was cut off at the designed elevations. In the case of the timber piles this varies from -23.25 up to -17.19. After the subgrade was completely dry, a 1-foot-thick base stabilization slab of concrete was poured over the area into which the timber piles project 6 inches.

The 8-foot-thick gate-bay floor and the 5-foot-thick approach floors were then poured in alternate monoliths, using Blaw-Knox steel forms. The floor elevation in the gate-bay is -14.75

(Concluded on next page)

Cut Your Costs, too



Above: An International TD-9 Diesel Crawler with Dozer-Shovel is loading gravel on a wagon drawn by a modified International ID-9 Diesel Wheel Tractor.

On opposite page: An International TD-9 with Bulldozer-Shovel is shown loading rock on a truck in a quarry that supplies a crushing plant.

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C. & E. M. Photo

The concrete batch plant for the Bayou Sorrel Lock was set up on the east bank of the north approach channel. The Rex 1/2-yard mixer at the left was used to pour the concrete foundations for the two Ransome 2-yard mixers at the right.

while the top of the wall is at elevation 24.0. The earth fills or connecting

levees are also built up to the latter elevation. The gate-bay has an inside

horizontal clearance of 56 feet, and walls tapering from 6 feet thick at the bottom to a 2-foot minimum at the top. In the approach-channel sections, also 56 feet wide, the walls are constructed to elevation 12.0 mean sea level. The floor elevation remains at -14.75.

Concrete is discharged from the mixers into Blaw-Knox 2-yard concrete buckets of which there are eight on the job. Four flat-bed trucks, each carrying two buckets, then haul the concrete 800 feet to either side of the structure where they are lifted to the forms by two cranes, a Northwest and a Lorain, each with 75-foot booms.

Quantities and Personnel

The major items included in the Bayou Sorrel lock contract, scheduled

for completion this year, are:

Excavation for structure	108,000 cu. yds.
Connecting levees, haul fill	119,000 cu. yds.
Excavation, north approach channel	395,600 cu. yds.
Excavation, south approach channel	300,000 cu. yds.
Round timber piling	66,084 lin. ft.
Steel sheet piling	18,271 sq. ft.
Concrete	7,923 cu. yds.
Reinforcing steel	1,310,000 lbs.

An average force of 25 men has been employed during the construction by R. Thos. McDermott & Co., Inc., under the direction of A. O. Oberson, Superintendent. The pile-driving crew numbered 8. Supervising the contract for the U. S. Engineers is M. G. Chitty, in charge of field headquarters at Baton Rouge, with E. H. Hewes, Resident Engineer on the project. The New Orleans District is headed by Col. Leonard B. Gallagher, District Engineer.

Tool Explodes Studs Into Steel or Concrete

A new hand tool for the installation of studs and similar operations has recently been introduced by The Tempo Products Co., 402 Perry-Payne Bldg., Cleveland 13, Ohio. Called the Tempotool, it uses the explosive-power principle of operation.

Its primary function, according to the manufacturer, is to speed and simplify installation operations where it is necessary to attach steel to steel, or steel to concrete, brick, or mortar. Because it is a self-contained power tool, there is no need for wires or air lines. No drilling is involved.

Source of power for the tool is provided by exploding a cartridge in an enclosed chamber or breach. The explosion forces a pin or stud through the short barrel and into the steel with sufficient force to set it firmly, the company says. In addition to the drive pins, both male and female threaded studs are available to accommodate bolts or threaded rods.

Some of the recommended uses for the tool include securing duct supports to concrete and steel; attaching angle-iron machine frames to concrete floors; and securing conduit straps to concrete or steel framing.

There are three models of Tempotools: the 22 for attaching metal objects up to 1/8 inch thick to steel or concrete; the 38, which can be used with mild steel up to 5/8 inch thick; and the 45 for use on heavier jobs requiring penetration of mild steel up to 1 1/4 inches thick. Cartridge charges of three different powers are available for the 38 and 45.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 21.

Concrete-Form Dictionary

A "dictionary of concrete forms" is the description given to its new catalog by the Irvington Form & Tank Corp., 19 Park Place, New York 7, N. Y. Important points relating to the Atlas Speed forms for wall, floor, or foundation work are listed alphabetically in the catalog, according to subject group.

The information is presented in a terse but complete manner. It is designed as a guide to the use of all the Atlas forms. Among the equipment made by Irvington are such specialized units as traveling wall forms, tunnel forms, caissons, bins, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 100.

Sales Mgr. for Hercules

The appointment of R. J. (Ray) Nymberg to the position of General Sales Manager has been announced by the Hercules Steel Products Corp., Gallion, Ohio; he was formerly associated with the Gar Wood Industries, Inc., Wayne, Mich. Hercules manufactures a line of hydraulic hoists, bodies, and other automotive equipment.

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Urban Thoroughfares Challenge to Engineers

Need for Arterial Routes Through Cities Is Urgent; New York Has Special Bureau For Studies and Plans

By B. D. TALLAMY, Chief Engineer,
New York State Dept. of Public Works

♦ **HIGHWAY** builders, through the roads they created, have always had a profound influence on the civilized world. In recent years, the highways and the motor vehicles together have revolutionized our very mode of living. Our very survival depends upon them. They affect our health, our happiness, and that of our families. They affect the livelihood of everyone.

Generally speaking, inter-urban state highway systems have kept pace pretty well with the increased number of motor vehicles using them and with our nation's increased dependence upon them. But that is not so with urban highways. During the 35-year period that motor vehicles and inter-urban highways have been increasing at such unprecedented rates, our cities too have been growing like Topsy. Unfortunately such growth was unplanned from the broad point of view and consequently militated against arterial-highway construction in urban areas. Nor were such unplanned spurts of city growth confined to the last 35 years.

Frequently, at the very outset, our cities were laid out and grew according to a preconceived plan. But as the limits of that plan were approached, satellite developments sprang up. Often these were completely unrelated to the nucleus community, except possibly for one or two inter-urban highways which had been previously established in the area. As a result, most of our modern communities have far too few through routes. Many that do exist are much too narrow, all are jammed with traffic, and only an insignificant number can be widened effectively.

The Engineer's Problem

The situation which prevails around our urban arterial highways is more difficult to correct than that which exists on our state highway system. Traffic densities are greater, right-of-way costs infinitely higher, and cost of construction much greater.

A practical solution to the problems which these conditions precipitate is a part of the challenge which has been laid down to the highway engineer. The other and equally important part of the challenge is this: to create a system of arterial routes which not only will carry state highway traffic to and from its destination and origin in urban areas, but will at the same time stimulate healthy city growth.

A city is really a living thing. It is constantly changing. It is always growing and deteriorating. The balance between the two determines whether it is a static or a healthy growing community. Like every living being, its vitality depends upon its circulatory system. Shrunk, congested arteries mean stagnation and creeping paralysis. Efficient, free-flowing arteries mean vigor and health. To develop a system which will stimulate city growth properly is the second part of the new challenge laid down to the highway engineer by the urban arterial program.

Before the highway engineer can proceed with the development of a system of arterial routes, he must know what makes the central city and all of the suburban areas tick. He must be fully aware of financial conditions in the local communities and the state, so that he can design a system which not only will

meet all the factors involved but will be financially practical as well.

Master Plan Developed

New York State believes the best way to meet this challenge is first to prepare a master plan of state arterial-route development for each urban area of the state.

The plan is based upon all of the factual data that can be secured relating to the community and its environs. It is designed to meet future as well as present traffic requirements and to be

capable of expanding still further in the future as conditions warrant.

Upon completion, the plan is submitted to the local officials for their consideration and approval. Afterwards the Legislature, with the approval of the Governor, is requested to place the various routes set forth in the plan upon the state system of highways.

Following that, the Department of Public Works selects from the master plan projects for construction, in accordance with their individual need and available financing. It can be confident in so doing that each project is a part of a carefully thought-out whole plan which, when constructed, will redound to the best interest of the city as well as of the state.

Should city officials disagree about the need for or wisdom of a portion of

the plan, round-table discussions are held to adjust differences of opinion and to amend the plan so that all agree it is to the best interest of all concerned.

Local approvals have been expedited by submitting to the local officials, at the time of presenting the master plan, all of the basic material upon which it is predicated, together with a report on the line of reasoning followed by the Department in its interpretation of this material.

In 1945, the technique of urban arterial-route planning was strange to our Department. The Legislature, on the recommendation of the Governor, had authorized the Department for the first time in its history to plan and to construct, as funds are made available, a state system of urban arterial routes

(Continued on next page)



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Urban Thoroughfares Challenge to Engineers

(Continued from preceding page)

for each city in the state.

This action was taken in recognition of the ever-increasing volume of inter-urban and regional state traffic which either originates within, terminates, or flows through those metropolitan sections. Between 80 and 85 per cent of the traffic on the New York State highway system in those areas is of that character. Maintaining and expanding the facilities necessary to support that traffic within cities has become, or is rapidly becoming, an impossible burden to the city taxpayer.

The arterial-route legislation was passed in order to lift most of the load resulting from state traffic from the taxpayer's shoulders, and at the same time enable him to secure the indirect benefits which spring from the creation of a fully adequate arterial system and which are almost always of parallel importance. That and the comparable Federal legislation were master strides forward in highway progress.

In New York State there are 61 cities having a population of more than 5,000. Actually, they and their suburban areas vary in size from about 10,000 persons to over 1,000,000, exclusive of New York City. Some are commercial communities, some principally industrial, others primarily residential sections.

To develop master plans of arterial routes for these alone is a Herculean task. For only in New York City itself had the planning of such routes advanced to a stage where both the state and the local officials could agree as to the appropriateness of the proposed system and adopt the local master plan without prolonged study.

In the other metropolitan sections, however, complete arterial-route studies had to be made. There, local planning emphasis had been directed at other objectives. In most of the smaller cities no local planning of any sort had been undertaken. Frequently they were "unzoned".

Planning Staff Set-Up

To make the problem still more difficult, the historic training of our Department's designing staff had been directed towards the development of primary inter-urban state highways and routes of lesser importance. City arterial-route planning, and even construction, was a new field to them. In order to overcome this difficulty, a Bureau of Arterial Route Planning was created in the Department. This was designed to act as a consulting agency to work with our District Engineers and their staffs.

The Bureau organization includes a Director of Arterial Route Planning. He is directly responsible to the Chief Engineer. He is also responsible for the functioning of the Bureau. He has three Principal Engineers in charge of planning, to assist him. They in turn have a complete complement of men who are specialists in various fields such as traffic and planning, design and valuation. Within the Bureau there is also a group specially trained to develop art renderings and popular ways of presenting the statistical and other basic material upon which the plan is based.

The real work, however, is done in the District Offices. The District Engineer is responsible for the preparation of the master plan and for the collecting and preparing of all basic material. The Bureau merely consults with the District Engineer and his men. It advises them of the latest developments in other districts. It is particularly valuable in presenting a completely detached unprejudiced point of view. In the event of disagreement between the District Engineer and the Bureau, an interim statement or report is submitted to the Chief Engineer for a decision on the

point in question.

When the plan is completed, but before the final report is prepared for submission to the local officials for their review, a final inspection of the plan in the field is made by the Superintendent of the Department and his entire staff of advisers.

Types of Surveys

The field traffic surveys for these plans consist of volume counts at critical points of major street systems, and origin-and-destination surveys of both passenger vehicles and trucks. Parking practice, time and delay studies on congested major highways, and studies of special intersections and areas are also made.

The twelve-hour traffic census, nor-

mally conducted between 7 a. m. and 7 p. m., follows a standard procedure for this type of survey. Because of the man-power problem, these counts are scheduled for a Tuesday or Thursday preceding the date of the origin-and-destination survey set for a like day on the following week. Stations are manned by personnel from the District Offices. The number required for such a census varies from 50 to 250, depending upon the size of the community.

Vehicle volumes in each direction are recorded for each hour of the survey. At key intersections and points of obvious congestion, the number of right and left turning movements, in addition to the number of vehicles in each direction on every street entering the intersection, is recorded for each hour.

Vehicle volumes are recorded separately by type.

The return-postal-card method is used for the origin-and-destination surveys, with the exception of those conducted in smaller cities. There, the interview method is used. In the card survey, a series of questions is printed on Government postal cards asking where the trip began, where it ended, route followed, major intersections passed, type of vehicle, purpose of trip, and method of parking. The hour of the day and the station at which the card is to be passed out are indicated ahead of time on the card by members of the survey staff. A colored instruction card is also prepared and issued along with the origin-and-destination (Concluded on next page)

DW 10s SHINE

on this ZONED EQUIPMENT★job

WORKING on an important section of U. S. Highway 52, between Cincinnati and Portsmouth, Ohio, Fuller-Davies Co. is using an all-"Caterpillar" line-up to speed construction and keep down costs.

The machines on the job include four "Caterpillar" Diesel D8 Tractors for pulling and push-loading scrapers; two D7s, equipped with bulldozers and sheepsfoot rollers; two "Caterpillar" Diesel DW10 Tractors, rolling fast on rubber, to handle the longer hauls; and a

No. 12 Motor Grader to maintain haul-roads and do the finishing.

That's the kind of well-balanced team that many contractors have found unbeatable for giving them "lowest costs on earth."

Superintendent E. W. Redman likes the whole set-up, and he is especially enthusiastic about the job done by the wheel-type tractors. As he puts it: "These DW10s are very good on the long hauls. They really save us money."

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL

ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT

survey postal card. This instructs the driver to fill out the replies as soon as possible and to drop the completed postal card into the nearest mailbox.

Origin-and-destination stations are selected so as to form a complete cordon around the city limits and also at the periphery of the central business district; where necessary, additional stations are located to intercept crosstown travel. Police control of traffic is furnished through cooperation of the Division of State Police by assignment of troopers to outer cordon points and, where officially requested by local authorities, to inner points. In general, however, stations within cities are manned by local police.

A vehicle-speed and delay study forms another important part of the

complete traffic survey for each community. This is a field survey made by driving with traffic and recording total running time between designated points. When speed and delay data are related to existing street capacities and future estimated volumes, they supply valuable additional basic information for the design of a new thoroughfare pattern. They also serve as an excellent index to the efficiency of the proposed arterial system.

Experience has shown that the bulk of the returned origin-and-destination cards are received in about two weeks. Returns have been as high as 57 per cent. They are coded by the District Office survey staff and analyzed by making use of electrical accounting-machine equipment.

Origin-and-destination zones are related to the principal thoroughfares and, when possible, conform to the U. S. Census Tracts. The finally tabulated survey information permits an extensive analysis of the driving habits within the urban area. Succeeding steps in the studies relate these data to the overall community plan.

In conducting the 48 city traffic surveys completed last year and this, well over 7,500,000 vehicles were counted and 760,000 postal cards given out, 35 per cent of which were returned properly filled in. About 5,200 Department employees were used at different times to do this work and they had, correspondingly, a total of 600 state police and 1,000 local police to help them.

Terminal Facilities

Due regard has been given to the importance of facilities at the termini of the arterial routes which lead into the central district and other congested areas. It is recognized that these new highways will not be able to develop their maximum benefits unless terminal facilities are built to meet the anticipated increases in motor vehicles.

Parking of motor vehicles is a problem which affects every citizen of the community. The merchant is interested in his sales volume, the owner is interested in the stability of his property value. The shopper is concerned with the ease and convenience of making his purchase, and the downtown employee wants a convenient place to park his personal means of transportation.

At present, the solution to this perplexing problem seems to rest primarily with local enterprise, with local government providing an official leadership. The responsibility of the State is limited to the stimulation of local action and the provision of needed enabling legislation.

The urban-area reports emphasize the importance of this problem, and point out that the full benefit of the proposed arterial routes cannot be derived until some adequate solution to the parking problem is likewise undertaken.

Extent of Plans

Master plans have been prepared to meet anticipated traffic requirements 15 years after the date of the traffic survey. This period was chosen because it was believed to be about the maximum period for which a reasonably accurate forecast could be made, since there are so many influencing factors. In addition, it seemed to fit into a reasonable financial program.

In New York, the State meets the entire cost of construction, and one-half the cost of right-of-way. The only cost to the local government is for the other half of the right-of-way.

With continued Federal Aid for urban highway construction, and with a reasonable anticipated state program, it seemed that most of the arterial plans could be completed well within that 15-year interval. That being the case, the entire system could be constructed in sufficient time to observe its performance and other factors before advancing another plan for supplementing and extending the system, if required.

Progress Made

Since 1945, final reports have been submitted to Buffalo, Dunkirk, Rochester, Syracuse, and Rome. The first two have been approved and actual construction is under way in Dunkirk. Bids will be received at an early date for a major project in Buffalo, and others will follow in the near future. Approval of the other plans, which were submitted to the local authorities in September, was received last autumn. Actual construction will be undertaken as promptly as possible.

Plans for five other cities were ready for local presentation in October, and several others in November. The Department has 19 master plans of city arterial routes now on the drafting boards, and 48 city traffic surveys have been completed since 1945.

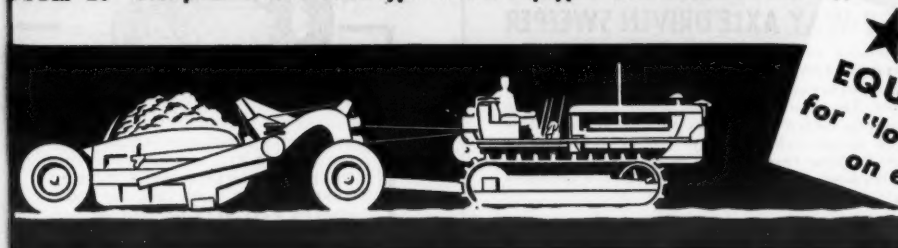
Construction of these systems will revitalize the arteries of our urban centers upon which we are all dependent. Blighted areas resulting from traffic congestion should largely disappear, decentralization of required central business areas should be halted, and city property values should be maintained or improved. When these systems are completed, traffic will not have to dodge and twist and worm its way through a maze of city streets. Time of travel between home and work will be materially cut down, commerce expedited, and safety increased.

From a paper presented at the 33rd Annual Convention of the American Association of State Highway Officials in New York City, September, 1947.



"Caterpillar" Diesel DW10 Tractors pull scrapers carrying earth to the fill on U. S. Highway 52, west of Portsmouth, O. (The standard model DW10 Tractor is priced, without scraper, at \$8830, F.O.B. Peoria, subject to change without notice.)

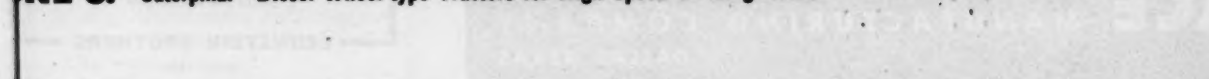
ONE 1. "Caterpillar" Diesel Track-type Tractors Equipped With Bulldozers and Rippers



ONE 2. "Caterpillar" Diesel Track-type Tractors for Loading and Pulling Scrapers



ONE 3. "Caterpillar" Diesel Wheel-type Tractors for High Speed on Long Hauls



★ ZONED
EQUIPMENT
for "lowest costs
on earth"



The front-mounted Atom post-hole digger for rubber-tired tractors is made in both hydraulic and mechanical models, with nearly all parts interchangeable between the two types.

Post-Hole Diggers Made in Two Styles

A front-mounted post-hole digger for use with most styles of rubber-tired tractors is made by The Atom Mfg. Co., Moline, Ill. The front-mounting feature is said to permit the operator to sit on the seat of the tractor in a normal position, and yet be able to see the digger in action. The Atom diggers are made in both hydraulic and mechanical models. Most parts on these two are said to be interchangeable, so that the mechanical model can be changed to a hydraulic one when desired.

Features claimed for this line of diggers include hydraulic fingertip control; oversized, enclosed gears; double-blade free-cutting auger; grease fittings on all moving parts; one-man operation; interchangeable augers varying in size from 8 to 16 inches; a special Atom tilting device which permits digging a perpendicular hole on any grade; and a clutch-type digger if needed.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 11.

Representative for Mrs. Moves Office in Washington

C. F. Winchester has announced the opening of a new office in the Denrike Bldg., 1010 Vermont Ave., N. W., Washington 5, D. C. Mr. Winchester, who recently resigned as Executive Secretary of the Associated Equipment Distributors, a position which he held for nearly seven years, is factory representative for several construction-equipment manufacturers.

The companies he represents include the American Conveyor Co., Chicago,

Ill.; Fontaine Truck Equipment Co., Inc., Birmingham, Ala.; Gar-Bro Mfg. Co., Los Angeles, Calif.; Insley Mfg. Corp., Indianapolis, Ind.; and the New Holland Mfg. Co., Mountville, Pa. With the exception of the Insley Mfg. Corp., he also serves as export representative for these companies as well as for the Jones Superior Machine Co., Chicago, Ill.

Land-Leveling Unit Has Hydraulic Power

Hydraulically controlled land levelers for use with all types of tractors are made by the Atlas Scraper & Engineering Co., 6203 Maywood Ave., Bell, Calif. The company recommends these units for leveling farm land for irrigation, for airports, and similar earth-moving projects. For more exact leveling work, Atlas makes a leveler plane attachment which is said to produce a finer grade.

Atlas land levelers are made in five models with cutting widths of 6, 8, 10, 12, and 14 feet. Depth of cut on all units is 6 inches; depth of spread is 12 inches maximum. All models can be obtained with a 30-inch bowl; standard height is 24 inches. The cutting blades are of high-carbon plow steel; they are double-beveled and reversible. Wheels can be mounted on either the side or rear; the rear mounting is recommended by Atlas for leveling work, and the side mounting for building borders and checks.

The plane attachment is a trussed-steel framework which converts the standard land leveler into a unit with a wheelbase of 48 feet. This increased length is said to permit a finer degree of grading. The attachment is available in 8, 10, 12, and 14-foot widths. All operations of the leveler bowl within the attachment are controlled hydraulically from the tractor. Wheels, tires, and front-truck and caster wheels are additional accessories available for the basic plane attachment.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 20.

Welding-Equipment Data

A 36-page three-color catalog on its complete line of Simplified arc welders is available for the asking from The Hobart Bros. Co., Hobart Square, Troy, Ohio. Various features of the machines are individually illustrated and de-

scribed, and helpful information is given on some typical welding problems. The catalog contains illustrations, descriptions, and specifications for each of the various units, as well as a complete list of Hobart electrodes and accessories.

Units described thus in the catalog are the electric-motor-driven dc welders in five sizes ranging from 150 to 600 amps; gasoline-engine-driven welders

in four sizes from 200 to 600 amps; ac transformer-type welders in three sizes from 200 to 500 amps; welding generators only in four sizes from 150 to 400 amps; gasoline-engine-driven welders with auxiliary ac or dc power generators; and other models in all sizes for special arc-welding applications.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 94

To SPEED UP mine-ventilation and preliminary field surveys, experienced engineers all over the world specify American Paulin System Surveying Altimeters.

Surveys in 1/10th the time with accuracy better than 1 part in 1000... extremely sensitive... portable... rugged.

Model SA-1:
Range 4360' (-760' to + 3,600') in intervals of 2'

Model SA-2:
Range 10400' (-1900' to + 9,500') in intervals of 5'

Model SA-5:
Range 15000' (-400' to + 14,600') in intervals of 10'

Other models in metric graduations covering all useful altitudes are also available.

All models priced \$200.00 complete with case, hand and shoulder straps, magnifier and thermometer.

See your dealer or write direct for descriptive folder AE.

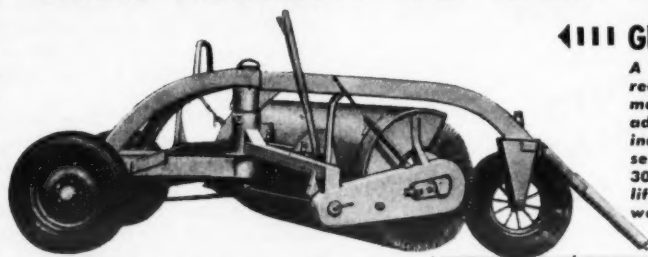
Also available for immediate delivery... the world's finest line of aneroid Barometers... descriptive folder on request.

AMERICAN PAULIN SYSTEM
Manufacturers of Precision Instruments
1847 SOUTH FLOWER STREET
LOS ANGELES 15, CALIFORNIA

Altimeters

MINIMUM UPKEEP—MAXIMUM PERFORMANCE

GRACE PRODUCTS ARE BUILT TO DO THE JOB RIGHT!



GRACE 2-WAY AXLE DRIVEN SWEEPER

A multi-service sweeper which meets the most rigid requirements. Simple transmission and pivoting mechanism assures simple operation. Completely adjustable, the brush lift and brush pressure are independently operated... May be changed in a few seconds to sweep either right or left at angles up to 30°. Anti-friction throughout. Brush features long life bristles and steel center shaft which eliminates warping!

GRACE RAPID FIRE III

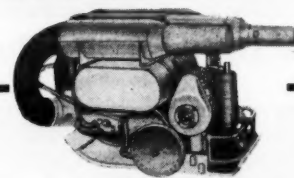
Combination Circulating and Steam Heater

Two units mounted on one chassis for maximum performance. Steamer can thaw one car while the circulator is heating and loading out another car by circulation. Asphalt flow over flues is 160 feet per minute at 200 GPM. Flue-expansion stress is eliminated. Powerful LeRoi D140 motor and pumps mounted on sturdy sub-frame which is bolted to main frame of heater. Chassis suitable for truck mounting.



W. E. GRACE MANUFACTURING COMPANY
6000 SOUTH LAMAR STREET DALLAS, TEXAS

PORTABLE HEATER SALE IMMEDIATE DELIVERY



STEWART-WARNER PORTABLE POWERFUL 100,000 BTU GASOLINE-BURNING HEATERS COMPLETE WITH TURBINE TYPE BLOWER AND 1½ HP. AIR-COOLED BALL-BEARING ENGINE.

PORTABLE SELF-POWERED MANY-PURPOSE HEATER

HEATING buildings, shops, sheds, warehouses, manholes, tunnels, buildings under construction, spot-heating, etc.

PRE-HEATING engines, tractors, trucks, equipment, etc.

THAWING frozen areas, machinery, pipe lines, tanks, etc.

DRYING plaster, paint, mortar, concrete, etc.

ORIGINAL COST.....\$583.00

SALE PRICE.....\$195.00

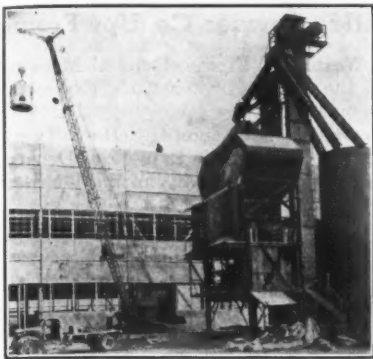
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BERNSTEIN BROTHERS

Since 1890

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PUEBLO, COLO.



The new Johnson portable ready-mix concrete plant is shown here in operation with a Koehring crane handling a Johnson 1 1/2-yard concrete bucket. The plant has a 2-yard capacity and is designed for operations which do not require large-capacity aggregate bins.

New Concrete Plant Is 2-Yard, Portable

Equipment for a portable concrete plant is made by the C. S. Johnson Co., a Koehring subsidiary located at Champaign, Ill. This 2-yard ready-mix plant is said to be easily moved and quickly assembled. Welded construction has been used throughout to reduce field bolting to a minimum and speed erection in the field. The plant is designed for the ready-mix operator who does not require aggregate-storage bins with large capacity because stockpiling facilities or quick truck deliveries from near-by plants are available.

The unit consists of a bin in two main sections, plus the two-column end frames, floor beams, and cross bracing. These sections are all less than 11 feet wide so that they can be shipped on railroad cars. There are four aggregate compartments and a central cement tank. The bin has a total capacity of 100 cubic yards, with auxiliary storage for both aggregates and cement in steel silos. These can be dismantled and shipped in flatcars. Bin capacity can be increased by adding a 5-foot extension in the center and reinforcing the supporting columns.

Aggregates and cement are batched by a Johnson concentric aggregate-cement batcher, discharging to a central mixer. The plant can also be adapted for use with fully automatic single-material batchers and recording control unit. Water is batched by a Johnson water weigh batcher which also discharges into the mixer. The mixer used with this outfit is a 56-S.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 6.

Water-Suction Hose

A new type of smooth-bore water-suction hose has been developed by the Hewitt Rubber Division of Hewitt-Robins, Inc., 245 Kensington Ave., Buffalo 5, N. Y. It is said to be made with the chernack loom type of construction in which the reinforcement consists of a woven-yarn carcass with interwoven round spiral wire. According to the manufacturer, if it is crushed or kinked it can be re-formed to its original shape.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 8.

Vibratory-Tools Catalog

A 92-page illustrated catalog covering its complete line of equipment has been issued by the Syntron Co., 227 Lexington, Homer City, Pa. It describes both the vibratory material-handling equipment and the construction and maintenance tools made by Syntron. This second category includes self-contained gasoline hammer paving breakers, portable electric hammers, drills, grinders, sanders, electromagnetic form vibrators, and flexible-shaft concrete-mass vibrators.

Copies of this literature may be ob-

tained by writing to the company using your business letterhead. Or use the enclosed Request Card, being sure to list company and title. Circle No. 87.

Allis-Chalmers Celebrates Its Hundredth Anniversary

This year the Allis-Chalmers Mfg. Co. of Milwaukee celebrates its 100th birthday. The company had its beginning with the formation of the burr-millstone firm of Decker & Seville in Milwaukee. Fourteen years later, in 1861, the mill was acquired by Edward P. Allis, a native of Cazenovia, N. Y. A series of expansions and amalgamations followed, as various projects required the production of new equipment which could only be handled by new machinery and new buildings to house it.

In May, 1901, occurred the merger of Edward P. Allis & Co. with the Fraser & Chalmers Co., Chicago; Gates Iron Works, Chicago; and the Dickson Mfg. Co., Scranton, Pa.—to form the Allis-Chalmers Mfg. Co. as it is today.

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LIPS THAT DO A BETTER JOB!



Lips, buckets, hammers, shovel teeth —ALL your equipment gets a new lease on life with SEACO HARD FACING WELDING ELECTRODES. High resistance to abrasive wear and actually improves with use. Takes terrific impact. Wears as long as many of the more expensive hard surfacing electrodes. Deposit in 1 or 2 layers.

NAME OF NEAREST DISTRIBUTOR UPON REQUEST

FREE FOR THE ASKING! Our Booklet, "The Welding of 11% to 14% Manganese Steel."

STULZ-SICKLES CO.

Sole Producers

91 N. J. Railroad Avenue,

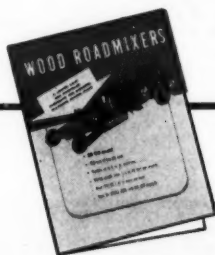
NEWARK 5, N.J.

ROADBUILDERS!

Build low-cost, all weather, farm-to-market roads

UNEQUALLED FOR
ECONOMY AND
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with the Model 36
WOOD ROADMIXER



Write For Bulletins

Wood Roadmixers are built in 3 models for all types of mixed-in-place surface pavement or base course construction. There is a model to fit your Farm-to-Market road building requirements. Write for illustrated bulletins and prices.

Farmers and taxpayers can have high-quality, all-weather farm-to-market roads without excessive costs... You, Mr. Roadbuilder, can build these mixed-in-place roads with the Model 36 Wood Roadmixer at less cost than by any other method of pavement construction. The Model 36 mixes native or imported materials with any type of liquid binder for flexible bases and all-weather tops... It mixes native or imported materials with cement for stabilized bases... It produces as much as 125 tons of mix per hour in ONE PASS... It is one-man operated... It does the mixing of 3 plus road graders... It is self-propelled... It can produce roadmix paving to meet any state or county requirement... It costs less per ton of capacity than any other comparable equipment on the market.

Wood Roadmixers have pioneered and led the field for 15 years in mixed-in-place pavement... Build your Farm-to-Market roads with Wood Roadmixers.

WOOD MANUFACTURING CO.

BOX 620, 6900 TUJUNGA AVENUE, NORTH HOLLYWOOD, CALIFORNIA



DESIGN FOR ROADMIX

Convention Calendar

Jan. 21-24—ASCE Meeting

Annual meeting, American Society of Civil Engineers, Hotel Commodore, New York City. Col. William N. Carey, Executive Secretary, 33 W. 39th St., New York 18, N.Y.

Jan. 26-28—ARBA Conference

Conference, American Road Builders' Association, Willard, Mayflower, and Statler Hotels, Washington, D.C. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D.C.

Feb. 1-3—Carolina Road Builders

Annual meeting, Carolina Road Builders' Association, Mid Pines Hotel, Southern Pines, N. C. Warren J. Mann, Secretary-Treasurer, P. O. Box 2826, Raleigh, N. C.

Feb. 2-5—Purdue Road School

Annual program, Memorial Union Bldg., Purdue University, Lafayette, Ind. Ben H. Petty, Professor of Highway Engineering, School of Civil Engineering and Engineering Mechanics, Purdue University.

Feb. 9-12—AGC Convention

Annual convention, Associated General Contractors of America, Baker and Adolphus Hotels, Dallas, Texas. H. E. Foreman, Managing Director, Munsey Bldg., Washington 4, D.C.

Feb. 11-12—Roadside Development

Seventh Annual Short Course on Roadside Development, Auditorium of Ohio Departments of State Bldg., 65 So. Front St., Columbus. Dallas D. Dupre, Jr., Landscape Architect, Department of Highways, Columbus 15, Ohio.

Feb. 15-19—AED Convention

Annual meeting, Associated Equipment Distributors, Edgewater Beach Hotel, Chicago, Ill. Frank G. Knight, Executive Secretary, 360 No. Michigan Ave., Chicago 1, Ill.

March 1-5—ASTM Meeting

Spring meeting and committee week, American Society for Testing Materials, Hotel Statler, Washington, D.C. C. L. Warwick, Executive Secretary, 1916 Race St., Philadelphia 3, Pa.

March 11-13—Mississippi Valley Meeting

Annual meeting, Mississippi Valley Conference of State Highway Departments, Edgewater Beach Hotel, Chicago, Ill. R. C. Keeling, President, O. L. Kipp, Conference Secretary, 1246 University Ave., St. Paul 4, Minn.

July 16-24—ARBA Road Show

Road Show, American Road Builders' Association, Soldier Field, Chicago, Ill. Charles M. Upham, Engineer-Director, International Bldg., Washington 4, D.C.

Design, Construction Of Pavement Sub-Bases

Two papers dealing with the subject of sub-bases have been made available in booklet form by the American Road Builders' Association. The first, "Sub-Bases for Rigid-Type Pavements", was written by F. V. Reagel, Engineer of Materials, Missouri State Highway Department. The other, "Design and Construction—Sub-Bases", was prepared by P. E. Masheter, Assistant Chief Engineer, Bureau of Location and Design, Ohio Department of Highways. These reports were presented at the 44th annual convention of the Association last year in the Palmer House, Chicago.

The purpose of Mr. Reagel's report, as he pointed out, is to review some of the questions which will present them-

selves to engineers when they consider the various kinds of bases for use under rigid-type pavements. He discusses the question of whether or not sub-bases are needed; the advantages gained by their use; the methods of preparing them, and other design considerations.

Mr. Masheter, in his paper, covers the development of the use of granular

blankets by the Ohio Department of Highways, with some observations as to the results obtained. He discusses design practices and trends, aggregate mixtures, and research needed.

Copies of Technical Bulletin No. 122, 1947, can be obtained at a price of 25 cents per copy. Write to the Association at 1319 F St., No. W., Washington 4, D.C.

Atlas Powder Co. Ups Frome

Weston G. Frome, General Manager of the Atlas Powder Co.'s Explosives Department, has been elected a Vice President of the company. He will continue as head of the Explosives Department and as a member of the Board of Directors.

LUBE MEMO

Easy way to end sticky valve trouble

Sticky gum on our valves

Ex. valve on #1 isn't closing - loss of compression and power.

Nelson brags RPM DELO Oil keeps his valves clean as a whistle.

Nelson says compounds in RPM DELO Diesel Engine Lubricating Oil keeps valves free 3 ways:

1. Anti-oxidant stops gum formation
2. Metal adherent keeps oil film on stem - prevents wear.
3. Detergent cleans away carbon deposits.

Mon. - lube change due - get RPM DELO Oil



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Get a Line on an Owen!



with a MOUTHFUL AT EVERY BITE

The OWEN BUCKET CO., 6030 BREAKWATER AVE., CLEVELAND, OHIO. BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.

For faster digging, ease of handling on difficult jobs and lowered operating costs, "get a line on an Owen Bucket". Owen designs and builds to meet your every general or specific requirement. The workings of an improvement-conscious engineering department are evidenced in field performance everywhere on dredging, excavating and material handling jobs.

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(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York 16, today)

From _____

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Name _____

Firm _____

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Road Upkeep Hard As Subgrade Freezes

Northern State Highway District Uses Ingenuity Aplenty in Short Season To Maintain Its Roads

♦ **ALTERNATE** freezing and thawing, frost boils, a short working season, and a shorter budget are just a few of the practical problems which Idaho Bureau of Highways District No. 5 is facing, and whipping. Bordering on the British Columbia provincial line, this district has some of the toughest and most interesting maintenance problems in the entire northern tier of states.

It has a native soil so light and fine that 100 per cent will pass through a No. 200 sieve. The plasticity index of that soil is 99. It will grow 55 bushels of wheat to the acre. But when the frost leaves the ground in spring, the highways across that soil have to be marked down to maximum loads of 300 pounds per inch of tire tread—and still the roads need constant attention.

The story of Maintenance District No. 5, its people and organization and methods, is a story of America's highway problems accentuated a hundred-fold by heavy logging trucks, bad weather, and worse soils.

District Climate, Topography

District 5, far up against the Canadian line, is the smallest and most remote in Idaho. District Engineer R. M. Parsons, and Harry Hubbard, his Maintenance Engineer, are exactly 450 miles away from Boise, the state capital. For Idaho is a long state, and the northern panhandle is narrow.

The district comprises five counties: Kootenai, Benewah, Shoshone, Boundary, and Bonner. It is bordered on the west by the state line of Washington and on the east by northwestern Montana.

In this remote spot are 565 miles of the state highway system, about 80 per cent of which is road-mix or penetration bituminous surface 20 feet wide. The highways crawl through meandering river canyons, cut through rock, and only in a few places lead through level land. For the five counties are largely mountainous and heavily forested. The lumbering industry is one of the prime sources of the region's wealth, and one of the biggest headaches to highway engineers who have to repair road damage behind the behemoth loads.

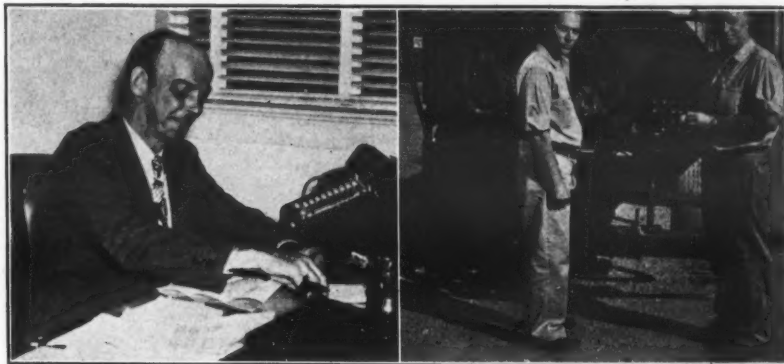
The climate in District 5 is good for bituminous work only 60 days out of the year, for certain: the months of July and August. However, 5 miles of bituminous highway were resurfaced before June 1 in 1947—a feat never accomplished before in that region.

In general, maintenance from Janu-

ary 1 to March 1 consists of snow removal and sanding of icy hills. From March 1 to June 1 the frost boils appear in the spring break-up. Maintenance men are busy then filling holes, leveling the highways and keeping them safe.

Bituminous work starts about June 1, but is often held up by spring rains until about July 1. For two months asphalt work goes into high gear. Autumn is the time for dressing shoulders, cleaning roadside ditches, and removing sloughed-in dirt from the watercourses. Any time after November 15, snow is again a problem.

The alternate freezing and thawing cycles, occurring as often as seven times in a season, play havoc with subgrades and are the biggest single cause



C. & E. M. Photos

Here are some of the people who battle Idaho maintenance problems in District 5. District Engineer R. M. Parsons is shown, in the first photo, at his desk in Coeur d'Alene. In the other photo, Maintenance Engineer Harry Hubbard (left) and Shop Foreman Jack O'Toole face the camera by the side of a Mack-mounted distributor.

of pavement failures in the district.

District Maintenance Organization

The maintenance organization operates in four directions from central headquarters at Coeur d'Alene. R. M.

Parsons, the alert new District Engineer, has delegated all maintenance responsibilities to Harry Hubbard, his Maintenance Engineer. Both men have been with the Highway Department for

(Continued on next page)



"Speed on the Job and to and from the Jobs"

"QUICK-WAYS" are unmatched for versatility. Whether you want a shovel, crane, dragline, pile-driver, clamshell, trench-hoe, scoop or backfiller, you have all eight in one "QUICK-WAY" on one chassis.

To that add these five features:

CONVERTIBILITY Any "QUICK-WAY" converts in minutes from one unit to any other.

PORTABILITY Your "QUICK-WAY" travels on or off the road at truck speed, spends more hours working.

FAST OPERATION Fast "QUICK-WAY" hoist and swing action moves more material per day.

INTERCHANGEABILITY Many "QUICK-WAY" parts are interchangeable... easier adjustment and repair.

ECONOMY Low initial investment, low maintenance cost.

These advantages all add up to greater profits on any job you give a "QUICK-WAY". There's a "QUICK-WAY" owner near you: ask HIM.

Model E: 4/10 cu. yd. cap. for mounting on any standard 5-ton truck.

Model J: 1/4 cu. yd. cap. for mounting on any standard 1 1/2-ton truck.

Service available from our Distributors, strategically located throughout U. S. and worldwide.



For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.
DENVER, COLORADO

First to build power shovels for truck mounting; still the leader after 29 years

National Carbide FLOOD LIGHTS

Are

Simple in construction
Economical in cost
Dependable in operation

Available in 1,500, 8,000 and 16,000 candlepower units

Write for literature showing complete line of Floodlights and Lanterns

NATIONAL CARBIDE CORPORATION
60 E. 42nd St. New York 17, N. Y.



Road Upkeep Hard As Subgrade Freezes

(Continued from preceding page)

many years; Parsons since 1927.

A 49-man crew, which includes 12 maintenance foremen, makes up the maintenance organization. These men are specialists. Some have been with the Highway Department 20 years or more. They are as adept on summer bituminous work as on winter snow removal. Many of the gangs have worked together so long they know each other's qualifications and limitations.

Each foreman with his gang operates on a regularly assigned section of highway from 30 to 100 miles in length. A reserve gang at district headquarters performs general maintenance near by, but goes out whenever it is needed for special work, such as slides, snow removal, or an excessive maintenance job in another man's territory.

In addition to these twelve gangs, Hubbard uses a bridge foreman in the fall of the year, and a traffic-stripping crew.

Maintenance funds are allocated to each district on the basis of population, vehicle registration, and highway mileage. Since District 5 is the smallest one in the state, but with perhaps some of the toughest problems, a nice balance was hit during 1947 with an appropriation of some \$700,000 to maintenance. The total maintenance funds in the five districts of Idaho were only \$5,000,000 for the year.

Out of the \$700,000, about \$350,000 was tagged for maintenance betterment contract work. Insofar as possible, Idaho has always tried to use the contract system even for maintenance. A lack of contractors in the region, plus some excessively high bids, forced a sharp curtailment of the contract program. But it was still expected to eat up about half the maintenance allotment.

E. W. Swan, District Engineer in District 5 up to the end of 1946, summarized contemporary maintenance problems in his 1946 biennial report. He stated:

"Since the re-establishment of this district in 1927, after its merger with the Lewiston District in 1923, mileage of state highways under maintenance has increased to 564 from the 1927 figure of 222. This increased mileage was more often than not through those areas where construction was heavy and difficult, and usually maintenance on those sections was more costly per mile due to slides in deep cuts and heavier snow-fall on summits.

"With each succeeding year traffic demands a smoother road in the summer and a well sanded smooth surface in the winter. This demand is caused by the manufacture of cars and trucks which are relatively safe to operate at high speeds and are more comfortable for winter driving.

"Heavier loading of trucks and the increased number of vehicles on the road daily has caused many old roads built 10 to 15 years ago, and built to withstand little more than the traffic and loads of that time, to give way.

"The need for bringing the already designated highways up to date to stand this increased traffic and loading, together with the lesser amount of work involved in serving new communities with secondary or feeder roads, has increased the scope of work of the District each year.

"During these past two years little new construction was under way, and only maintenance of a character which could not be postponed was undertaken."

Parsons and Hubbard are faced with those same problems. However, efforts are now being made to step up the routine maintenance. The 1947 program called for 75 miles of bituminous reconstruction, and at the end of July about 27 miles of this had been done.



"We'll either get it all done or knock a big hole in it", Parsons said.



C. & E. M. Photos

On a bituminous-repair job in Idaho's District 5, an Autocar-mounted shop-made distributor shoots U. S. 10, east of Coeur d'Alene, with MC-5 asphalt (left). At right a dump truck and Buckeye spreader box dust a blot coat of sand on fresh asphalt.

bituminous-treatment surface, only 117.9 miles of crushed rock, 12.2 miles of bituminous concrete, and 15 miles of portland-cement concrete. Thus the maintenance job is concerned largely

Maintenance Methods

In District 5 there are 419.1 miles of

with the repair of bituminous surfaces.

In general, three distinct types of bituminous maintenance jobs are done.

1. Old bituminous mats are torn up by rippers, the subgrades are repaired and dried out, and the bituminous material is then re-laid with additional bitumen, if that is necessary. This is done on those sections too far gone to respond favorably to any kind of surface treatment.

2. Where good bituminous roads with stable subgrades are getting excessive wear, they are reinforced by a wearing course of MC-5 and 5/8-inch-minus surface chips.

3. Where asphalt bleeding has occurred and highways have become slick, a new wearing surface of asphalt and light sand blot coat is put down.

On the first type of construction which incidentally is the biggest job, 5 miles were finished last summer in a 6-day work week. The District has seven Adams motor graders and one Austin-Western 99-M. It uses the 99-M

(Continued on next page)

Para-Plastic

Reg. U. S. Pat. Off.

THE POSITIVE AND PERMANENT RUBBERIZED SEALING COMPOUND AND ITS COMPANION PRODUCTS

enable you to meet satisfactorily practically every condition ordinarily encountered in connection with water seal, vapor seal, expansion and contraction in heavy construction—road paving, bridges, dams, reservoirs, spillways, tunnels, sanitary works, airport paving, underground electric terminals.

Para-Plastic is a formula containing rubber and other chemicals, with its own particular and distinctive characteristics. It was created specifically because practical construction experience has shown that ordinary asphaltic or tar sealing compounds may fail during certain phases of the expansion and contraction cycles. This experience also clearly showed what characteristics a material must have in order to form a complete water seal all year around, at all temperatures.

Para-Plastic has those characteristics to an exceptional degree.

It is a rubbery, resilient, adhesive plastic which will adhere to steel, metal, wood, tile, glass, concrete and all forms of masonry. It is cohesive, as well as adhesive, and is therefore self-healing.

It will not become brittle or hard at low temperatures. It remains resilient, adhesive and effective at temperatures from zero to 140° F, and in this range will maintain a positive bond, a continuous seal.

The use of Para-Plastic establishes a new and better art in the protection of expansion and contraction joints against water infiltration.

Since the material has entirely different characteristics, which have now been proven in thousands of miles of roads and hundreds of installations in other construction, it is important that the trades be properly educated in its use, so that the civil engineer and architect can make full use of this better art.

Rigid adherence to the detailed application instructions appearing on every Para-Plastic bag or package is essential.

In much of the standard paving work Para-Plastic is hot-poured in conformity with Federal Specification SS-F-336. For some special applications however, it is more practical to use pre-moulded shapes of Para-Plastic which we design for each job. On all jobs which call for any kind of special application, we suggest you write us for a definite recommendation.

Para-Plastic is used in conjunction with various other products to form the complete joint structure, such as Servicised Kork-Pak which we recommend as the better filler.

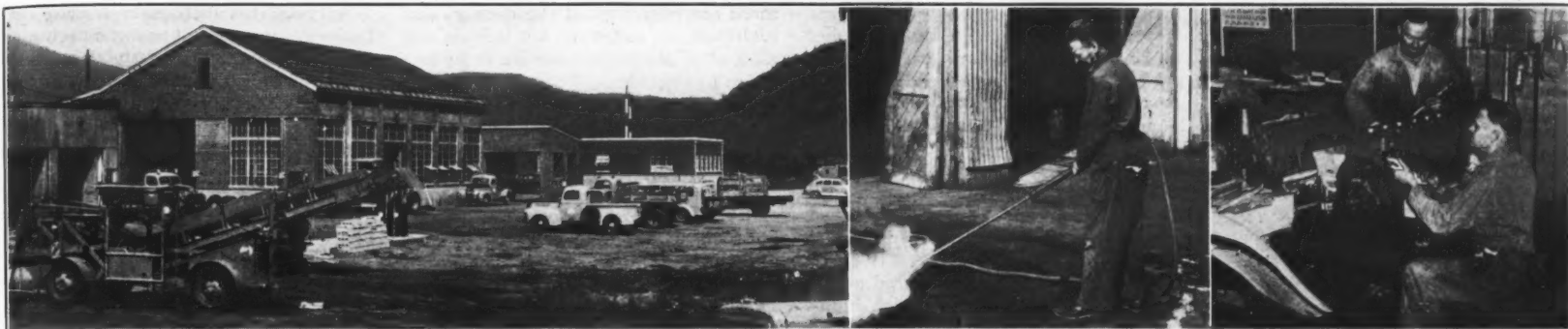


Write for literature and complete details on the other Servicised products which have been standard in this field since 1920.

SERVICISED PRODUCTS CORP.

6051 West 65th Street,

Chicago 38, Ill.



C. & E. M. Photos

Idaho District 5 maintenance equipment is stored and repaired at district headquarters. The first of these three pictures shows the repair shop at left, district headquarters in the background, and a portion of the yard. The second shows a "must" at the shop—steam cleaning of all repair parts. And in the third, Mechanics H. A. Stevens (left) and E. G. Healy repair a truck engine in the main shop.

machine almost exclusively for ripping up old bituminous mat, because this machine is quite heavy, according to Maintenance Engineer Harry Hubbard. The front tires are filled with water when the scarifier points, equipped with H & L teeth, dig down and rip up the pavement.

On some of the old highways put in before a flexible base was considered a "must", the old earth subgrades are sour-smelling and moldy. The motor grader blades the old bituminous material over to one side of the shoulder, and then these old subgrades are worked for as long as 3 days. A heavy-

duty Baker disk, behind an Allis-Chalmers tractor, has been used to good advantage in these places.

There are, however, some fine volcanic silty soils 100 per cent of which will pass a 200-mesh screen. These are the headache. These soils can be dried and aerated in hot sun and wind

for 24 hours, and they will still have 25 per cent of moisture. Where possible, the upper wet surface is removed, and a flexible base of crushed material is brought in. Down near Kellogg and Wallace the District can purchase 5/8-inch-minus crushed quartzite from the silver mines for as little as 25 cents per ton. A carload, purchased for \$12.50, costs about \$60 for freight to the far end of the District.

This white quartzite makes an excellent sub-base, or holds up fairly well with a bituminous topping. At various other places in the district these materials are produced by contract. Idaho specifications are so written in District 5 that all fines rejected through the No. 4 screen become the property of the State. This fine material is then stockpiled and used, in winter, for sanding icy hills. This is an example of how one maintenance item becomes a sort of by-product of a prime item.

Whether flexible base or native earth is to be used under reconstruction, extreme care is taken to get the best possible results. A Bros pneumatic-tire roller is used on subgrades, sub-base, and bituminous topping. On the light soils, as much as 12 inches of crushed rock is often required; 8 inches is an absolute minimum for most of the clay and silty soils in the district, according to Mr. Parsons.

If bitumen has to be added to sweeten the old material, the District uses either MC-3 or SC-3, depending on the weather and location. The asphalt is put on with one of three distributors operated by the District.

For cover-coating work, which is always done on jobs which have been re-laid, the District covers the top with from 0.3 to 0.4 gallon of MC-4 or MC-5 from the refineries at Spokane, and spreads about 40 pounds of 5/8-inch-minus stone chips per square yard. A Buckeye truck spreader box is available in the District for this purpose.

On dust-coat work, a very light coat of about 0.17 to 0.18 gallon of MC-5 is applied, and the surface covered with 170 cubic yards of 1/4-inch-minus sand per pile of 20-foot road. Rates of progress have been excellent on this work, considering the fact that the bituminous season coincides exactly with the peak tourist season. The week that this magazine's Western Editor visited the District, 5 1/2 miles had been covered full width and rolled with the 10-ton tandem Huber roller which is always on the sealing jobs. That night the men got home about 10 p.m. Normally they work a 10-hour day.

The District owns three distributors. One of these, made up by Shop Foreman Jack O'Toole, is a 1,200-gallon tank mounted on an Autocar truck. It has a heavy-duty asphalt pump providing full circulation under 32-pound pressure. Its 9-foot spray bar is equipped with 21 Oil-Rite distributor nozzles set 5 1/2 inches apart. The others have Walker distributor bars.

Mowing Is Done

The District maintains shoulders and roadsides through the summer months by using one Case and two Toro mow-

(Continued on next page)

Why KORK-PAK?

Because the improved Kork-Pak gives you 5 definite advantages

1. **Kork-Pak is more fully resilient.** It has a greater recovery—between 80% and 90% as against 70% for ordinary fibre joints. The more fully the space below the seal is kept filled during contraction, the less danger exists of penetration of the seal by dirt, stones and other non-compressible material, which might cause a blow-up when expansion takes place.

Contractors will find that less sealing material is needed when Kork-Pak is used because it keeps the joint more nearly filled.

2. **Kork-Pak handles readily without breaking.**

3. **Kork-Pak absorbs less water—only 8% by volume as against 15% for ordinary fibres.**

4. **Kork-Pak is non-extruding.**

5. **Kork-Pak has the desirable characteristics of the more expensive joints combined with low cost.**

Figure 1 illustrates how Kork-Pak fills the joint fully at time of insertion. In Figure 2, the Kork-Pak is shown compressed as in period of maximum concrete expansion. The importance of the high resiliency of Kork-Pak becomes apparent at the time of maximum concrete contraction as shown in Figure 3. The recovery of Kork-Pak is sufficient to prevent large openings between it and the concrete which could become filled with non-resilient material in time and cause a blow-up.



Look at Figure 4 again to see what you do not want. A joint filler that does not really fill the whole joint will only cause trouble in a short time. Traffic jams dirt through the seal into the spaces not filled and permits water penetration.



P. SERVICISED PRODUCTS CORP.
6051 West 65th Street, Chicago 38, Ill.

Road Upkeep Hard As Subgrade Freezes

(Continued from preceding page)

ers full time. Case parts are now easy to get at almost any supply house for agricultural tractor equipment. Experiments are being made, particularly around guideposts and guard rails, with Borascu soil-sterilizing mineral. Some of the new hormone-type noxious weed killers are also being used.

Bridges Are Problem

Northern Idaho has many rivers and lakes, and the maintenance of bridges is a hard, costly problem. The big state highway bridge at Sandpoint, Idaho, lacks only a few feet of being 2 miles long. Last year its deck started to give way. Repairs to the deck were doubling almost monthly, so it was necessary to put a complete deck on the bridge. This involved 1,000,000 board-feet of decking.

Situated in the heart of the Potlatch lumber district, the State couldn't buy the decking material. It had to make a personal canvass of a number of small mills, taking the timber in small lots from many suppliers. Some of the boards were wet, and shrank in the building. Strangely enough, about 2½ carloads of spikes required to fasten down the decking presented no problem. The spikes were an off-breed size, and were available.

During 1947 every bridge in the District was personally inspected and examined closely by the Bridge Engineer. He made a list of things to be done on every structure. Some require major repairs; some need a bolt or two tightened. As soon as the bituminous rush was over, the bridge foreman was assigned a crew and this work was started.

Ditches Cleaned in Fall

Every autumn, ditch cleaning is a heavy activity. The very light soils erode from backslopes, and wash in off the shoulders. In order to re-establish the original ditch lines, the shoulders are bladed down and sloped towards the ditch. Excess dirt is then pulled up along the pavement. The District has one Athey Force-Feed Loader, and this machine has been worth its weight in appropriations for loading an earth ridge to truck beds, Hubbard said.

The dirt is loaded out to a fleet of dump trucks and dumped off the side of embankments within right-of-way limits. The District operates about 25 trucks of various makes, and assigns them where they are needed.

Snow Removal

The snows of northern Idaho are not as severe as one might think, but frequently the ground is covered by a 2½ to 3-foot pack in winter. An Oshkosh unit with a V-blade and wing, two heavy FWD trucks with blades and wings, an FWD and an Autocar-mounted Snogo rotary plow do a thorough job on snow removal, particularly on transcontinental Routes 10 and 95. However, ice is something else.

Snowbanks melt by day, run down over the superelevated curve sections, and turn a dry pavement to glistening, treacherous ice. All these sections must be sanded promptly. The consumption of sand on icy roads is greater in this than any other Idaho district. Stockpiles are distributed at strategic, easy-to-get-at points all over the system, and trucks haul the sand out to be spread.

All equipment is stored and repaired at district headquarters, where repair facilities are available. The shop is rather lightly equipped, with replacement of standard parts the objective rather than any manufacture of parts.

The district yard has facilities for unloading tank-car asphalt from the railroad spur. Two 10,000-gallon stor-

age tanks are filled by a V-8-driven Roper asphalt pump. A Buffalo boiler of 22 hp heats the tank cars and the storage tanks. An overhead standpipe permits trucks to be loaded, including a new 3,000-gallon trailer unit.

Traffic Control

The most serious problem of all is still heavy traffic, and its control. Read what Swan said about it in his official biennial report:

"The war years just past bred a disregard for most laws concerning highway loading and safety features. The demand for lumber and metals was so great that the trucks were loaded up heavier and heavier, and this is still in practice. We of the Highway Depart-

ment are cognizant of the damage our highways are suffering, but lacking any kind of police powers we are in no position to stop it.

"We place our usual load limits and pray that some conscientious truck driver or owner will abide by them. I believe a couple did. Not many, though.

"Many abuses to the highways now suffered could be corrected, were police powers given to those who most quickly recognize the damages these fast, heavy loads do to our highways. This would entail the placing of at least one highway patrolman with police powers in each district, and he would be required to work under orders of the Department of Public Works only."

Actually it is a situation so acute that highway-department maintenance men have now started seriously to consider the advisability of discontinuing all maintenance on heavily traveled logging highways. Actually this has not been carried through. Maintenance men are still working every day, using sand or gravel or dirt or anything else available to fill in the awful holes made by 14-ton loads of logs.

"Why not just stop it?" some of them ask. "Why not let them mire down until they come to their senses?"

This is not a place to editorialize, but the writer saw a state patrolman pass by a load of 25 huge logs, to stop a tourist with a last year's license. The

(Concluded on next page)



WRAP UP YOUR MAINTENANCE PROBLEMS WITH THIS EQUIPMENT PACKAGE...

Allis-Chalmers HD-5 Tractor with Tracto-Shovel® and Model A-D Motor Grader

*All-'Round, All-Year Machine — Besides 1 cu. yd. standard bucket, interchangeable attachments for Tracto-Shovel include ¾ cu. yd. narrow bucket and bucket teeth, 2 cu. yd. snow loader bucket, bulldozer blade and V-type snowplow. Outfit may be used with Gar Wood 2-wheel scraper, too, using shovel hydraulic system.

SOME OF THE JOBS YOU CAN DO WITH THIS COMBINATION — working together or separately:

- | | |
|----------------------------------|-------------------------------------|
| Clean and shape-up ditches | Make fills |
| Cut and smooth backslopes | Do all bulldozing |
| Handle regular maintenance | Plow, move and load snow |
| Widen and reshape roads | Skid trees |
| Make driveways | Load rocks and stumps |
| Build berms | Dig and load dirt or other material |
| Scarify roads | Mix black-top |
| Backfill pipe, culverts, bridges | Do crane work |
| Take out cuts | Handle hauling or pulling |



A TYPICAL DON
straightening
down hill
proper drain

load of logs probably weighed in excess of 10 tons, plus the truck's weight.

Rumor has it that the logging interests have now succeeded in getting orders to state highway patrolmen, through state political channels, to forget to molest logging trucks. It is a matter of record that the portable scales, used for some time by the Highway Department, were found unlawful in a court of Idaho law, the plaintiff being a logging outfit.

Facing this kind of difficulty, but maintaining a highway system for which he need make no apologies, seems to be the destiny of the maintenance man. And if that be so, then certainly the maintenance forces of District 5 are fulfilling their destiny!

Dummy-Joint Machine Has Vibratory Cutter

A catalog on the Flex-Plane vibratory joint installer has been prepared by the Flexible Road Joint Machine Co., Warren, Ohio. It describes how the machine can be used to install any type of dummy contraction joint in a concrete slab—longitudinally, transversely, or both.

The folder shows cross-sectional drawings of the Flex-Plane joint, and several photographs of the machine in operation. It also describes the insert drag and the molding strips. It pictures recent modifications in the equipment and points out that it can be furnished with or without the vibrating feature.

In addition to this catalog, No. H-32, catalogs on other equipment are available. These describe the Flex-Plane finishing machines, automatic spray machines, mechanical dowel-spotters, and highway striping machines.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 70.

Barber-Greene N.Y. Dealer

Capitol Equipment, Inc., of Troy, N. Y., has been named a dealer by the Barber-Greene Co., Aurora, Ill. Capitol will have exclusive representation for the Barber-Greene Construction and Industrial Division in the Albany and Mohawk Valley territory.

Safety-Garment Catalog

A line of safety garments to meet a variety of needs is the subject of a catalog put out by the Holcomb Safety Garment Co., 128 No. Jefferson St., Chicago, Ill. It includes welders' protective garments such as sleeves, leather bib overalls, leather jackets, gloves, leather aprons and bibs, neck and cape sleeves, safety spats, and leggings.

The catalog describes these in detail and lists the features claimed for them. Bulletin No. 105 also describes the line of asbestos mittens and other asbestos products.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 86.

ROAD PROTECTION AT LESS COST

Allis-Chalmers Brings You A New, Low Cost Plan For Road And Street Upkeep

No need to make a major investment in equipment to handle various jobs. Any maintenance work . . . and much of your construction . . . is quickly, efficiently done with this versatile combination — AT BIG SAVINGS. There is only a nominal original cost with correspondingly low upkeep . . . but the work accomplished is considerably widened. Take a look at the list of jobs you can do — it's endless! Whatever your maintenance problem, this equipment package will wrap it up at the lowest cost.

Outfit moves quickly from one job to another. HD-5 on trailer easily pulled by A-D motor grader.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



PICAL DONE —
lightening cutting
hill ditches for
er drain

JOB NEARING COMPLETION — all grading handled with HD-5 and Tracto-Shovel and the Model A-D Motor Grader. Surplus dirt loaded into trucks with shovel . . . shaping and finishing done with grader.

CLEANING-UP DITCHES — here the road surface is kept intact, only ditches and slopes made. Accomplished by pulling up dirt with A-D motor grader and loading surplus into trucks with HD-5 and shovel.

CUTTING THE BACKSLOPES — sloping, ditching, rough and fine grading . . . all these jobs are quickly, accurately handled with the greater earth-moving capacity of the Model A-D motor grader. Its extra traction and power make it the ideal machine, too, for scarifying and plowing snow.



The Whiteman Power Buggy can haul a 2,000-pound load of wet concrete, dirt, tools, etc., up a 25-degree ramp. It has a 12-cubic-foot volume and a speed range of 2 to 15 mph.

Powered Wheelbarrow

A powered wheelbarrow said to be able to haul a 2,000-pound load up a 25-degree ramp is made by the Whiteman Mfg. Co., 3249 Casitas Ave., Los Angeles 26, Calif. It is designed for handling wet concrete, dirt, bricks, tools, refuse, etc. Power is furnished by a 6-hp air-cooled 4-cylinder engine. It has a 12-cubic-foot volume and a speed range of from 2 to 15 mph, forward or reverse.

The Power Buggy is 28 inches wide with single wheels, and 36 inches wide with dual wheels. It has a rear-wheel drive, and a full 360-degree rotating drive mounting. The manufacturer says the unit will turn in its own radius. The power unit is equipped with an automatic clutch and variable-speed changer through a worm-gear reducer. Bucket height is 34 inches, and total weight is listed at 750 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 10.

How to Make Pipe Joints

A sheet of instructions on proper jointing of vitrified-clay pipes has been prepared by the Clay Sewer Pipe Association, Inc., 1105 Huntington Bank Bldg., 17 So. High St., Columbus 15, Ohio. The purpose of this instruction sheet, as stated by the Association, is to improve the quality of sewer construction; it does not favor the use of any particular jointing material over any other, but concerns itself solely with how to secure the best results from the particular material used.

The sheet tells by drawings and text how to clean the pipes; heat the bituminous material, if used, or else how to mix the cement mortar; how to lay the pipe, including the preparation of the bed; how to align the pipe; how to prepare it for the joint material; and lastly, how to pour the compound.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 62.

Metal-Cutting Tool Operates Under Water

A new tool for use in underwater metal-cutting operations has been demonstrated by the Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y. Known as CutTrobe, it has a special exothermic coating for focusing and intensifying the energy of the electric arc; this, it is said, enables the user to cut steel plates or sections without external equipment, such as oxygen or gas tanks.

According to the manufacturer, the CutTrobe can be used with low-voltage arc-welding current supply, and it cuts cast iron, stainless steel, copper, nickel, aluminum alloys, etc. Speed of cutting can be determined by control of the amperage.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 28.

Manganese-Steel Parts For Tough, Abrasive Usage

Equipment used by contractors is often subjected to severe and abrasive use. For this reason, it is of the utmost importance that wearing parts be made of materials which will deliver the best service over the longest period. A new bulletin has been issued by the American Manganese Division of the American Brake Shoe Co., Chicago Heights, Ill., devoted to its tough austenitic manganese steel to provide resistance to shocks, pressure, and abrasive wear.

This 48-page bulletin, No. 1143-CI, has been written especially for the construction industry. It is designed to help both the manufacturers and users of construction equipment. It shows how Amsco manganese steel has been used on dippers, crusher parts, chains, ditchers, tractors, loaders, bulldozers, scarifiers, asphalt and concrete-mixer parts, wire-rope sheaves, welding products,

Amsco-Nagle material-handling pumps, dredge pumps, and other equipment.

The bulletin contains a list of 24 questions and answers covering the history, physical and chemical characteristics, and uses of manganese steel. It is well illustrated with on-the-job pictures, graphs showing the properties of this steel, and microphotographs of its internal structure.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 63.

New Yale & Towne Building

The Philadelphia Division of The Yale & Towne Mfg. Co. has opened a new service building in New York City. It is located at 205 E. 43rd St., and provides facilities for complete technical and sales services for the company's line of materials-handling equipment. It houses the Division's offices, a showroom, a completely equipped parts depot, a maintenance garage, rental service, and other service features.

NEW...built for Construction

An Exclusive combination of Benefits are now Created for You by These New Heavy-Duty Jacks!



Check these cost-cutting features of the new 30-ton FB-11 and the 50-ton GB-11. They bring you outstanding new jack performance never before known in construction and maintenance work. (Other Blackhawk models include 3, 5, 8, 12, and 20-ton sizes.) See your Blackhawk Industrial Supply Distributor for full information on these new Jacks.

A Product of BLACKHAWK MFG. COMPANY
Dept. J 1818, Milwaukee 1, Wisconsin

Always Specify

BLACKHAWK

HYDRAULIC JACKS

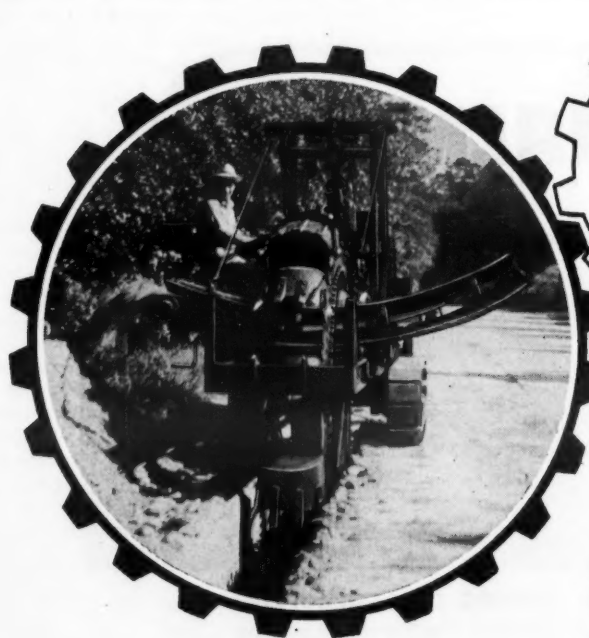
• **PATENTED DOUBLE PUMP**—all in ONE unit! Speed pump provides fast load-contact—powerful load pump cuts in automatically! No shifting handle or double-yoking as with separate pumps.

• **ALL-DIRECTIONAL OPERATION**—Full power and travel at any angle, vertical to horizontal. Handle forms positive side-rest for horizontal use.

• **GAUGE EQUIPPED**—Base is tapped for hook-up of gauge to show amount of pressure exerted—for measuring or testing applications.

• **PUMP BEAM PROTECTION** is provided by handle and base. Pump is concealed. Beam is protectively enclosed at entry point to base.

• **SUPER STRONG BASE**—machined from single piece of non-porous steel. Release valve is recessed to prevent accidental lowering and breakage.



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for contractors, highway officials and distributors wanting further details or printed matter from the manufacturers advertising in these pages. Our Reader Service Department will be glad to forward any literature or special requests you mail to us at the above address.

CONTRACTORS AND ENGINEERS MONTHLY

Portrait in Print

By BILL QUIRK

Contractor Sees Unlimited Program Of Highway Construction Ahead

♦ "WE are only at the beginning of a highway-building program which can have no set limits to meet adequately the present and future needs of traffic." Thus commented D. W. Winkelman, President of the construction firm bearing his name, in a recent interview at his office in Syracuse, N. Y. The short, stocky, serious-looking contractor, who has been building roads in nearly every state east of the Mississippi River, feels the urgency for more and better highways to handle the increasing volume of travel which grows bigger each year. "I do not believe a single state can say that its highway system takes care of present-day traffic properly, much less of the traffic we can expect in the future", he continued.

Highway construction has played and is still playing an important part in the fortunes of the D. W. Winkelman Co., although its job portfolio usually contains a varied assortment of projects in the general contracting field.

Winkelman, who has been nominated for President of the Associated General Contractors of America for 1948, was Vice President of AGC during the past year and has been on its Executive Committee for several years. He has also served as President of the New York State chapter, and as Chairman of the Highway Construction Division of the AGC. Such recognition is awarded only to those who can qualify by reason of their heavy experience in the construction industry. As a private operator, or president of his own contracting company, Winkelman has for the past 20 years been establishing a solid reputation as one of the foremost general contractors in the eastern part of the country.

Engineering Start

Born 46 years ago in the little town of Lohrville, Iowa, of Dutch-English parents, Winkelman attended Morning-side College at Sioux City, and graduated from the University of Iowa in 1924. He holds two degrees, for he studied finance and commerce in addition to the regular civil-engineering course—an ideal scholastic combination for any contracting-minded young man. Within three years after graduation Winkelman was a full-fledged contractor.

Fresh out of college he went to work for the Minnesota construction firm of Minder & Cain which had an office in Chicago. His first job was in the Windy City, constructing a concrete conduit for the Commonwealth Edison Co. Later he went down into the Deep South on another job for Minder & Cain, where he got his first road-building experience. He also worked for a brief time with the Mississippi State Highway Department as a junior engineer. Following that interlude Winkelman returned to his earlier employer and worked both in Florida and in the north.

In 1927 he undertook his first job as a contractor. Palm Island, a small piece of made land in Miami's Biscayne Bay, was being developed, and Winkelman subcontracted to pave the streets, dig the sewers, and install the water mains. Although the total project was not very large, the variety of the work was good experience for a young contractor just getting started. After he had successfully completed this initial venture, he worked on several highway contracts for the Florida State Road Commission. With this experience in road building he bid for highway jobs in Illinois, and

got enough work to warrant opening an office in Chicago.

Establishes Syracuse Office

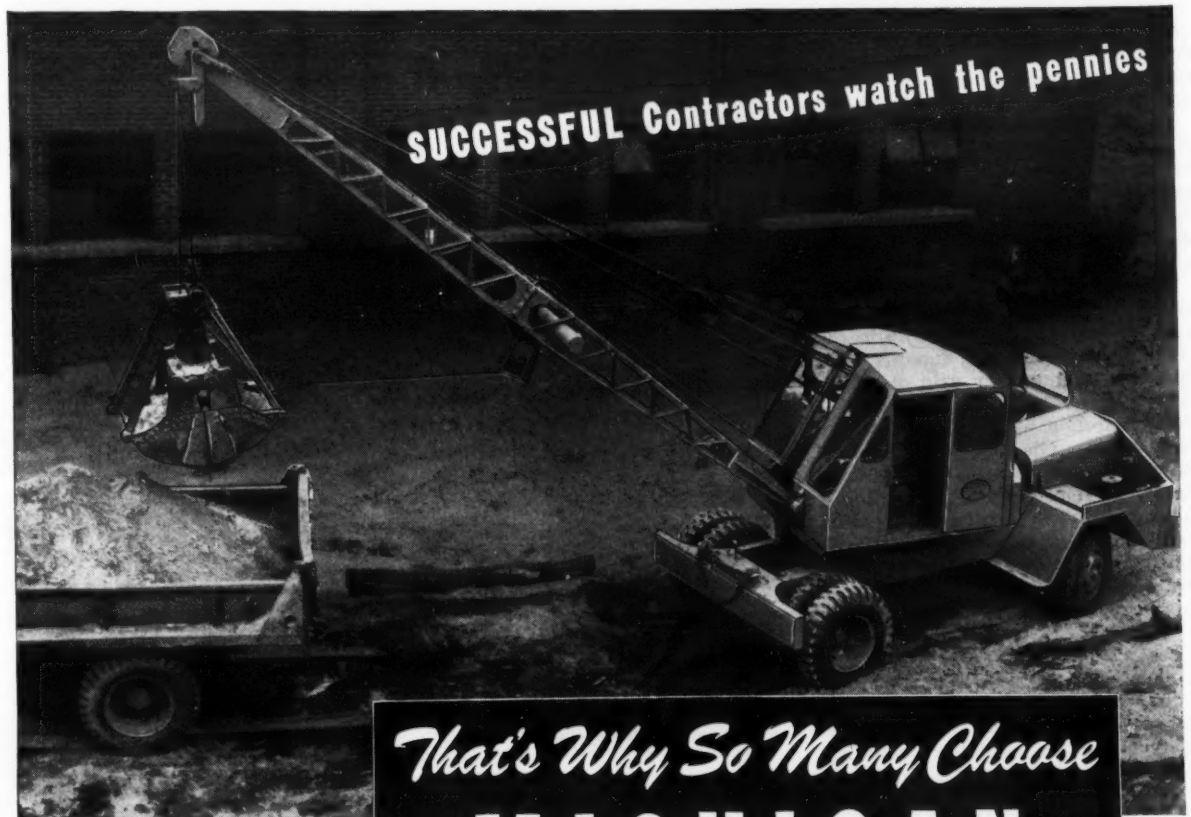
Winkelman mixed his highway contracts with other types of construction. He built levees along both the Mississippi and Illinois rivers, laid out sewer systems, constructed water works, and graded new golf courses while he operated out of Chicago. In 1930 he came to New York State to put in the structures on a road job far up in the Adirondack Mountains. The Barge Canal crossing the state usually had

(Concluded on next page)



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Contractor Sees Big Road Program Ahead

(Continued from preceding page)

some jobs for contractors, and Winkelman got a few of these. New York seemed like a good field for a general contractor, so he set up his office in Syracuse, centrally located in the Empire State. He now occupies a 7-room suite of offices in the downtown Heffernan Building, and employs an office staff of fourteen.

In 1930 he married Marguerite Powers of Chicago. The Winkelmans live in Skaneateles, a small village 16 miles from Syracuse, at the head of Skaneateles Lake, one of the Finger Lakes group. Here the contractor indulges in his main hobby—horses. Both he and his wife, together with their two sons, Dwight William II, 13, and Peter Jan, 7, are riders. The energetic contractor keeps a small stable of horses and enjoys both hunting and riding.

"We have several horses," he said with a smile, "and about double the number of children around all the time to enjoy them. Once in a while I find time to play a little polo at the Cortland Polo Club south of here, but I usually have to wait until I get down in North Carolina to do any hunting."

The Winkelmans have a winter home in Southern Pines, N. C. There, in the traditional scarlet coat, he rides to the hounds in the fox hunts among the Carolina sand hills and pine trees. He also plays polo at nearby Pinehurst, when time permits.

The prematurely-grey-haired contractor has managed to find enough work in North Carolina to justify his living there during the months when Syracuse is in the icy grip of winter. Currently he has six jobs going in North Carolina and fourteen in New York State. Glancing over some of these contracts, through dark-rimmed glasses, he remarked: "I would prefer to have fewer but larger jobs. Handling twenty contracts at once poses a terrific managerial problem. But that is just one of the problems that confronts a contractor."

Equipment-Minded

Long before the war, Winkelman was acutely conscious of the importance of being well stocked with plenty of modern construction machinery, and had acquired a well balanced inventory of up-to-date equipment. Thus he was well prepared to handle the diversified military construction which the authorities always wanted built in a hurry. Jobs ranged from a bomber base at Syracuse, southward to an airport at Natchez, Miss., and landing strips in New Orleans. Some of his most interesting construction was done for the mysterious Clinton Engineering Works at Oak Ridge, Tenn. Winkelman had approximately 30 different contracts on the Manhattan Project—the atomic secret that was so carefully kept through all the months of development.

"I was asked if I could send construction crews in there which could keep their curiosity in check," the contractor recalled. "That wasn't particularly difficult. I had known all my key organization personally for a good many years. They could be relied



C. & E. M. Photo

D. W. Winkelman, President of the construction firm bearing his name, is shown here at his office desk in Syracuse, N. Y. One of the foremost general contractors in the East, Mr. Winkelman has been nominated for AGC President in 1948.

upon to do their work well and not butt into things that were no concern of theirs. We did grading in the area,

operated quarries, installed utilities, constructed a railroad, and helped build the city of Oak Ridge. That was all contract work and bid for. No fixed fees were involved."

Forms Company

For over 15 years D. W. Winkelman has been an individual operator in the contracting business, with J. M. Nicolson and L. S. Cain as participating partners in some ventures. In 1943 D. W. Winkelman Co., Inc., was formed with Winkelman as President. His principal associates in the business are attorney Edmund H. "Ted" Easter, his executive assistant; L. S. Cain, the son of Winkelman's first employer; and J. M. Nicolson.

Winkelman also has business interests in Syracuse Constructors, Inc., which owns and operates an asphalt plant and is primarily engaged in paving city streets; also in the Dwight Rigging Co. and the Syracuse Rigging Co. The latter two concerns are engaged in the transportation of heavy

equipment, steel erection, and crane service.

During the war he served on the War Production Board, Industry Advisory Committee, and after V-E Day he was sent to Europe by the Chief of Staff as an investigator to study advanced construction methods that the Germans had been using. Now in peacetime he serves as a member of the Consulting Constructors' Council of America. He is also director of a Syracuse bank and a member of the Board of Trustees of Syracuse University.

With all these activities it is not strange that the horses in the D. W. Winkelman stables feel somewhat neglected these days.

Mack Truck Names Fikejs

The appointment of Harold J. Fikejs as Manager of its Milwaukee direct factory branch has been announced by Mack Trucks, Inc. Mr. Fikejs, who is 31, is one of the youngest men to hold a Mack branch managership.





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Curves Straightened On Road Relocation

Grading Contract Includes Two Bridges; Dirt Moved By Tractor-Scraper Units In 4.5-Mile Improvement

A 4.5-MILE stretch of U. S. 50, the George Washington Highway, in the mountains of West Virginia, has been reconstructed almost entirely on new location. This section of road between Smithburg and Sherwood in Doddridge County had been characterized chiefly by sharp curves with almost right-angle turns, and with grades up to 6 per cent. On the new alignment the sharpest curve is 6 degrees, and the steepest grade is 3.2 per cent.

Boso & Ritchie, Inc., of Ravenswood, W. Va., did the work under contract to the State Road Commission of West Virginia. Included in the \$560,000 contract were grading, drainage, and gravel-surface items, together with the construction of two bridges. A concrete pavement is expected to be added later under another contract.

The dirt excavation was handled by tractor-scraper units, moving 20 cubic yards a load. These scrapers are said to be the largest employed in highway construction by any West Virginia contractor. In fact, over most of the Mountain State the terrain is so rocky that scrapers are not widely used on grading projects.

Highway Parallels Railroad

Before this improvement, the existing 4.5-mile section was generally considered the roughest and most dangerous of the 82 miles connecting Clarksburg and Parkersburg. Its 16-foot concrete pavement, laid 30 years ago, was narrower than the rest of the pavement along this stretch of U. S. 50. The surface was cracked, and roughened by frequent patching with bituminous material, and its winding sidehill location was not conducive to safe driving.

The new road has been laid out in the narrow valley at the base of the sharply rising mountains. It roughly parallels the tracks of the Baltimore & Ohio Railroad, Monongahela Division. A right-of-way 60 feet or wider was obtained to accommodate the roadbed, which is 40 feet center to center of ditches in the cuts, and 38 feet between the outside edges of the berms on the fills.

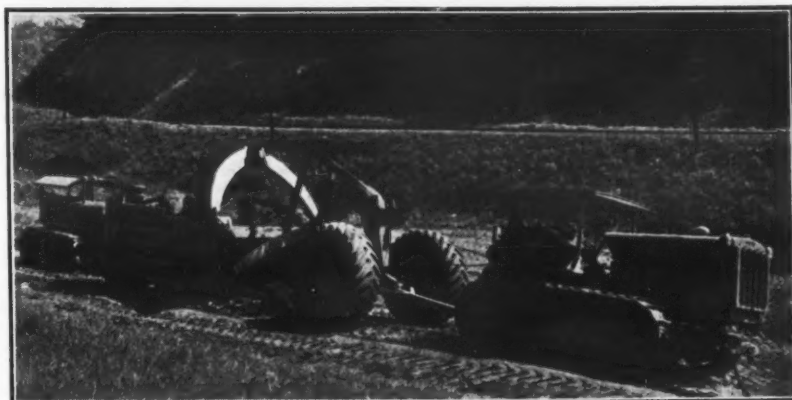
A 6-inch layer of gravel, 22 feet wide, was laid as a temporary surface; it has a center crown of 2 3/4 inches. The traffic-bound material is flanked by either 6 or 8-foot shoulders, sloping 3/4 inch to the foot. The side slopes in both cuts and fills are 1 1/2 to 1 except in the rock cuts where they are 1/2 to 1.

Grading Operations

The job got under way the middle of March and was completed this autumn. Two-way traffic was maintained over all points on the old road which were intersected by the new alignment. The grading consisted of leveling off the hills and filling in the valleys. It also

included some channel-change excavation in Lower Buckeye Creek which runs parallel to the road at several points. The cuts and fills balanced nicely, keeping the haul distances short; over the entire job there was a slight amount of surplus material to waste. From 40 to 50 per cent of the excavation was rock, while the remainder was mostly shale or clay.

Before any of the shale was moved it was first broken up by a LeTourneau Rooter, making it easier for the scrapers to pick it up. Three tractor-scraper units were used for all excavation other than rock. They consisted of LeTourneau Model W 20-yard scrapers pulled by Caterpillar D8 tractors, with the hauls averaging 600 feet. To assist in the loading, an Allis-Chalmers HD-



C. & E. M. Photo
In a cut on the Boso & Ritchie job in West Virginia, an Allis-Chalmers HD-14C pusher tractor helps a LeTourneau Model W 20-yard scraper, pulled by a D8, to load.

14C tractor-dozers pushed the scrapers for a short run. With these three units working an 11-hour day, an average total of 1,200 cubic yards of material was moved.

On the fills the dirt was spread in 8-inch layers by another D8 and an Allis-

Chalmers tractor-dozers, and rolled by a Huber 10-ton 3-wheel roller.

Handling Rock

When rock was reached, two Gardner-Denver wagon drills were set up to (Continued on next page)



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C. & E. M. Photo

Bridge excavation is shown under way at Lower Buckeye Creek on the George Washington Highway job. A Michigan TMDT 16 truck crane, with a 35-foot boom and an Owen 1/2-yard clamshell, loads a 16-yard Athey wagon pulled by a DW10 diesel rubber-tired tractor.

Curves Straightened On Road Relocation

(Continued from preceding page)

drill the blast holes. Only one was used at a time, with the other held as a spare. Air was supplied by a Gardner-Denver 500-cfm compressor. The holes were drilled on 4-foot centers to a depth of 12 feet on the average. Each hole was usually charged with 20 sticks of 40 per cent dynamite. Up to 150 holes were shot at a time.

After the blast, the rock was dug out with an 820 Lorain 2-yard shovel and loaded into three side-dump 16-yard Athey wagons. The wagons rolled on rubber tires and were pulled by Caterpillar DW10 rubber-tired tractors. The rock hauls averaged 700 feet.

Drainage Structures

In addition to several hundred feet of both reinforced-concrete and corrugated-metal pipe, the new highway is drained by six box culverts. These range from a 5 x 6 to a twin 10 x 9-foot structure. Two bridges cross Upper Buckeye Creek and Lower Buckeye Creek. The bridges have three 50-foot spans, totaling 150 feet supported on two abutments and two piers of reinforced concrete. A steel I-beam superstructure carries a concrete deck.

Bridge excavation was handled by a Michigan TMDT 16 truck crane with a 35-foot boom and an Owen 1/2-yard clamshell bucket. The Athey wagons were used for hauling the material away to the dump. At some of the bridge footings sheet piling was necessary. So 12-inch x 18-foot steel sections were driven by a 3,000-pound drop hammer working from the boom of the truck crane.

Concrete for the structures was mixed right at the site in a CMC 16-S mixer, of which there were two on the job. Materials were shipped over the B & O railroad to a siding at Smithburg at the western end of the job. Columbia bag cement was furnished by the Pittsburgh Plate Glass Co., from Zanesville, Ohio, while the sand and gravel for aggregate were supplied by the Ohio River Sand & Gravel Co., from Parkersburg, W. Va. The Truscon Steel Co. furnished the steel reinforcing. Water for the mix was pumped from the creeks by either a Sterling 2-inch or a Gorman-Rupp 3-inch pump. A Jaeger 4-inch diaphragm pump kept the footings dry during the concreting.

Wheelbarrows were loaded from the material stockpiles of aggregate and weighed on a Winslow Jr. scale before they were dumped into the mixer skip. The concrete was delivered to the wooden forms by two American Con-Vay-It conveyors having 12-inch-wide belts 30 feet long. These units are mounted on rubber tires for rapid portability and have an adjustable

frame that could raise the conveyor so as to handle the high pours. Mall and White vibrators were used to vibrate all the concrete as it was placed. Water and burlap were used for curing the concrete. The American Bridge Co., of Ambridge, Pa., will furnish and erect the structural steel for the two bridges.

Gravel Surface

A gravel surface was placed on the road when the grading was completed. Crushed gravel, from 2 1/2-inch down to fines, was shipped from the Ohio River Sand & Gravel Co., to the siding at Smithburg. There it was unloaded by conveyor into four trucks, two Fords and two Internationals, holding 5 tons each.

Because of the narrow space between

the railroad siding and the highway, two conveyors were used in the unloading, one at right angles to the other. The first conveyor, a Farquhar with a 24-foot belt, carried the gravel from the hopper-bottom cars straight out to a hopper placed between the track and the road. From this hopper the gravel fell onto a second Farquhar 20-foot conveyor paralleling the road. The trucks backed under the discharge end of this second conveyor to get loaded. Both units have 18-inch-wide belts and are driven by Wisconsin air-cooled engines.

The trucks tail-gated the gravel down the center of the roadway where it was spread out in a 3-inch course by an Allis-Chalmers motor grader with a 12-foot blade. Then a second course

was added in the same way, making the gravel layer 6 inches compacted thickness. Traffic was permitted over the surface to bind the gravel together and compact it in place.

Quantities and Personnel

The major items in this 4.5-mile grading contract included:

Excavation	422,700 cu. yd.
Concrete for structures	1,120 cu. yd.
Reinforcing steel	112,930 lbs.
Gravel for surface course	25,160 tons
Reinforced-concrete pipe, 18 to 36-inch	4,106 lin. ft.
Corrugated-metal pipe, 18 to 24-inch	710 lin. ft.

A total force of 55 men was employed by Boso & Ritchie, Inc., on the contract, which was under the general supervision of A. H. Ritchie, a member of the firm. H. C. Walden was the Superintendent. E. N. Blackwood was

(Concluded on next page)

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NEW Styling

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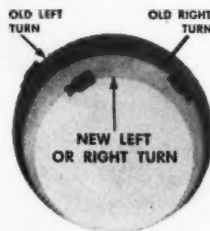
NEW Ease of Handling

Less turning space needed . . . right or left. Better weight distribution

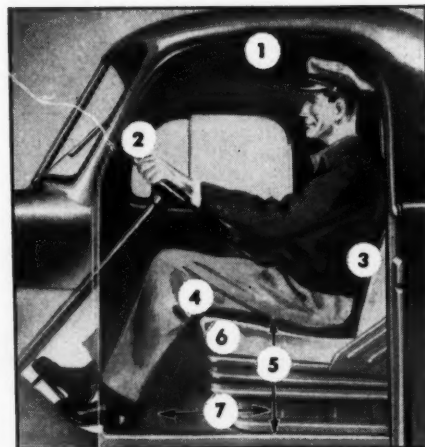
Remarkable new ease of handling and driving is yours in these new "Job-Rated" trucks. You can turn them in much smaller circles. You can park, back into alleys or up to loading platforms with much greater ease. You get all this with a new type of steering, in combination with shorter wheelbases that accommodate full-size bodies, and the roomier, longer cabs.

You get much better weight distribution, too, with this new design.

Front axles have been moved back, and engines forward. This places more of the engine and cab weight on the front axle. Loads are more evenly distributed.



NEW COMFORT



⑦ 7-INCH SEAT ADJUSTMENT . . . with safe, convenient hand control.

- ① PLENTY OF HEADROOM
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- ⑥ "AIR-O-RIDE" CUSHION . . . adjustable weight of drive and road conditions.

ALL THIS...
and more...with the

NEW DODGE

Bridge Engineer.

For the State Road Commission of West Virginia, Draco Dodrill, Project Engineer, was in charge of the contract. The Commission is headed by Ray Cavendish, with M. L. O'Neale as Chief Engineer. George W. McAlpin is State Construction Engineer, while Wilson Ward is Regional Construction Engineer.

Drainage-Equipment Data

A bulletin on equipment for digging drainage ditches and placing tiles has been prepared by the Buckeye Traction Ditcher Division, Gar Wood Industries, Inc., Findlay, Ohio. As pointed out in the bulletin, moisture control is important in more respects than in the

elimination of visible standing water. It is of utmost importance for all earth structures, subgrades, etc. Moisture control through tile underdrainage is the theme of the booklet.

It features a description of the Buckeye Model No. 301 drainage ditcher, said to provide simple, economical ditch-digging. Illustrated and explained is the maneuverability of the machine; according to the manufacturer, it assures accurate grading even over rough terrain. Bulletin No. 47-FD describes the 6-cylinder gasoline-engine power unit, the digging wheel and buckets, the automotive-type steering, and many other features.

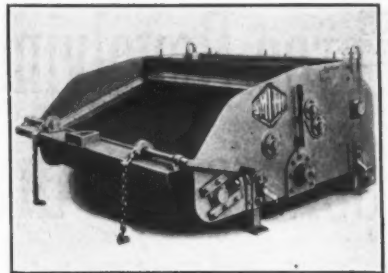
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 59.

Data on Financing Methods

A pamphlet on modern financing methods has been prepared by the C. I. T. Corp., 1 Park Ave., New York 16, N. Y. It presents case histories of eight firms which needed additional working funds, and describes C. I. T.'s plan of financing in each case.

Booklet No. 14-241 also tells how C.I.T. loans are obtained and how the payment of these loans can be adapted to meet the varying needs of the borrower. It tells how funds are made available for the replacement of machinery and equipment, and how collateral loans can be arranged.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 67.



This bulk-cement spreader for use in the construction of soil-cement-stabilized pavements can be operated by two men and features a uniform spread, says its manufacturer, The T. L. Smith Co.

New Bulk-Cement Unit Spreads and Measures

A new piece of equipment for use in the construction of soil-cement-stabilized pavements has been brought out by The T. L. Smith Co., 2836 No. 32nd St., Milwaukee 10, Wis. It is a machine specially constructed and designed for the spreading of bulk cement. It can be used with standard makes of dump truck by replacing or altering the truck's tail-gate.

As the spreader is towed over the grade by the truck, cement flows into the feeder compartment. The strike-off blade between this compartment and the measuring compartment is regulated to feed more cement into the measuring chamber than is being discharged. This is to insure a consistent and definite quantity of cement being discharged onto the roadway. Cement is conveyed past the strike-off and metering blades by means of an endless rubber belt. The belt is driven by two wide-faced metal wheels which support the machine on the roadway; therefore, the speed of the belt is synchronized with the machine's traveling speed.

Power from the wheels is transmitted to the belt by means of a roller chain on cut sprockets and an enclosed transmission, in which is located a reversing clutch which controls the belt's direction of travel. Clutches permit turning the machine without skidding wheels.

The spreader can also lay chips for a mat coat, if this type of wearing surface is desired. In such a case, the truck backs up over the previously laid asphalt and the chips are spread ahead of the road wheels. Belt rollers are equipped with mechanical scrapers so that the material will not build up on the roller surfaces. These scrapers also keep the wheels clean when the machine is being used for spreading cement.

According to the manufacturer, the metering blade on the measuring compartment can be adjusted to permit a maximum spread depth of 4 inches. The machine spreads a strip 72 inches wide, but part of the outlet from the measuring compartment can be blocked off if the width of the roadway is not in multiples of 6 feet.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 3.

Light-Reflecting Signs

A descriptive folder on its equipment for reflectorizing signs and markers has been issued by the Prismo Safety Corp., Huntingdon, Pa. Bulletin No. 547 answers such questions as these: What are the Prismo process, binder, and spheres of safety? How long will Prismo signs last, by whom and how can this equipment be used, what colors are available, and what are the steps in making a Prismo sign?

The folder pictures many different types of signs which have been reflectorized by Prismo, and shows night photographs of other applications, to point out the increased safety achieved through use of the process.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 22.

NEW Tractors and other High Tonnage Models!

You'll find, in these new high tonnage models, many exclusive advancements: Strong, durable metals and alloys . . . precise machining, and a much wider range of equipment. Engines have cost-reducing sodium-cooled valves, and stellite-faced exhaust valves and seat inserts. Other outstanding features include sturdy 5-speed transmissions; rugged 12" and 13" clutches; smooth, safe brakes—finest in the trucking industry.



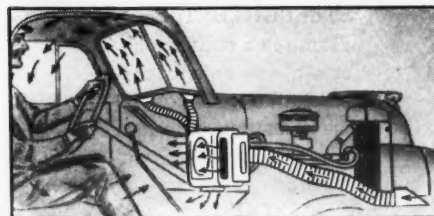
NEW "Pilot-House" Cabs with all 'round vision



Note the tremendously increased vision of these cabs. Windshields and windows are higher and wider. New rear quarter windows add still more to vision, and to safety.

With this increased glass area throughout, you get "Pilot-House" vision . . . in all directions. With welded all-steel construction, they're the safest cabs ever built.

NEW All-Weather Ventilation



You drive in comfort whether it's 10° below or 100° above. Available is an ingenious combination of truck heater, defroster vents, vent windows, cowl ventilator, and a new fresh air intake from behind the front grille. It's the finest "All-Weather" heating and ventilating system ever installed in a truck cab.

Job-Rated TRUCKS

Now on Display
SEE YOUR
DODGE DEALER

Three Revolving Cranes Place Concrete in Gravity-Type Dam

Trucks Haul 2-Yard Buckets From Central Mixing Plant To Wooden Trestle Built Along Downstream Face

(Photo on page 1)

† DELAYED by the war, construction of the combined rolled-fill and concrete gravity-type Center Hill Dam in north-central Tennessee is now moving along smoothly to meet a tentative completion date in March, 1948. The Center Hill Reservoir Project is a unit in the comprehensive flood-control plan of the War Department, Corps of Engineers. The new dam is located on Caney Fork River, 27 miles above its confluence with the Cumberland. It will check floods not only on the Caney Fork and Cumberland Rivers, but also on the Ohio and Mississippi which eventually receive the waters from this drainage area of 2,195 square miles.

But the project is multiple-purpose in its scope. Besides holding back flood waters, the dam will provide reservoir capacity for the generation of hydro-electric power. The newly made lake will be used for recreation, and the entire area will also have conservation features incorporated into it.

War Halts Construction

Work on the \$33,000,000 project started back in January, 1942. Three contractors—the Massman Construction Co., Metcalfe Construction Co., and the Gordon Hamilton Contracting Co.—all from Kansas City, Mo., joined forces for the venture under contract to the Corps of Engineers, Nashville District. After only a little more than a year of work, the war forced a shut-down in March, 1943. In January, 1946, construction was resumed by the same companies under a modified contract totaling \$14,956,000. The site is about 75 miles east of Nashville in De Kalb County.

The dam project includes a rolled-fill

earth embankment section across the left-bank flood plain, and a gravity-type concrete structure in the channel area of Caney Fork River. The concrete dam is 1,382 feet long with a maximum height of 246 feet. Three revolving cranes are placing the concrete, which is mixed in a central batching and mixing plant just downstream from the dam. Trucks transport the concrete to the cranes in 2-yard buckets. They use a wooden work trestle, which was built the full length of the dam across the downstream face, to deliver the full buckets and bring back the empties.

The earth embankment has a maximum width of 1,000 feet at the base. It is 778 feet long, to give the entire earth and concrete structure a total length of 2,160 feet. From the end of the concrete dam, the earth fill slopes down to natural ground to almost the beginning of the 400-foot non-overflow section, enclosing that much of the concrete structure. At the dam site the flood plain is only on the left bank. The non-overflow concrete section on the right bank ties directly into the face of a high rocky cliff rising sharply from the river. The stream-bed elevation is about 470, with the base of the dam at an average elevation of 455. The general flood-plain elevation is 510, and the top of the dam will be at elevation 696.

Two cofferdams were constructed to keep the river from the working area, but they have both been removed. Monoliths 10 and 12 of the spillway section, each 60 feet wide, were left low to take the stream flow. So far, No. 12 alone has sufficed to handle the diversion, but No. 10 is available if the river should rise. The two monoliths have been built up only to elevation 480, and they will remain at that level until the rest of the structure is completed. Then they will be brought up to proper grade.

Concrete Batch Plant

Downstream from the center of the dam about 500 feet is the concrete batching and mixing plant. The aggregate



C. & E. M. Photo
Supervising construction at Center Hill Dam for the War Department, Corps of Engineers, are T. A. Rydingsvard, Assistant Resident Engineer (left), and E. W. McCall, Resident Engineer.

gate enters the plant at the top over a long conveyor belt from the near-by crushing and screening plant. (See article on aggregate production which appears on page 95 of this issue.)

Two brands of cement are used—Lehigh from the Mitchell, Ind., plant,

and Penn-Dixie from Richard City, Tenn. Both are shipped in bulk to a siding of the Tennessee Central RR at Lancaster, Tenn., the nearest railroad and only 4 miles from the dam site. The cement is unloaded by a worm screw and enclosed elevator to a 700-barrel storage bin alongside the track. Six enclosed, 1½-ton trucks transfer the cement to two large Blaw-Knox silos adjoining the batch plant, each with a capacity of 6,000 barrels. From there the cement is raised from the receiving hopper through an enclosed elevator to a 500-barrel bin at the top of the C. S. Johnson batch plant.

The plant has four bins for the different sizes of coarse aggregate and one for the sand, with a total capacity of 200 tons. The various gradations are fed from the bins into weighing hoppers equipped with Kron dial scales and located on the next lower level. From there the weighed materials drop into a central hopper, and the total ingredients are chuted into any one of the

(Continued on next page)

This "COMPLETE" ASPHALT PLANT



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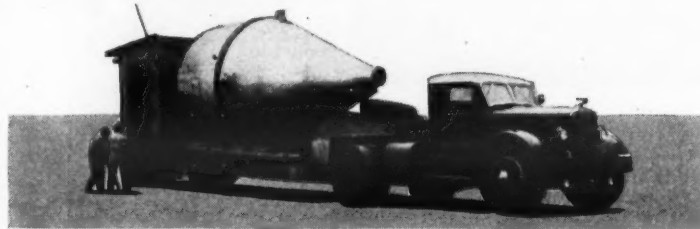
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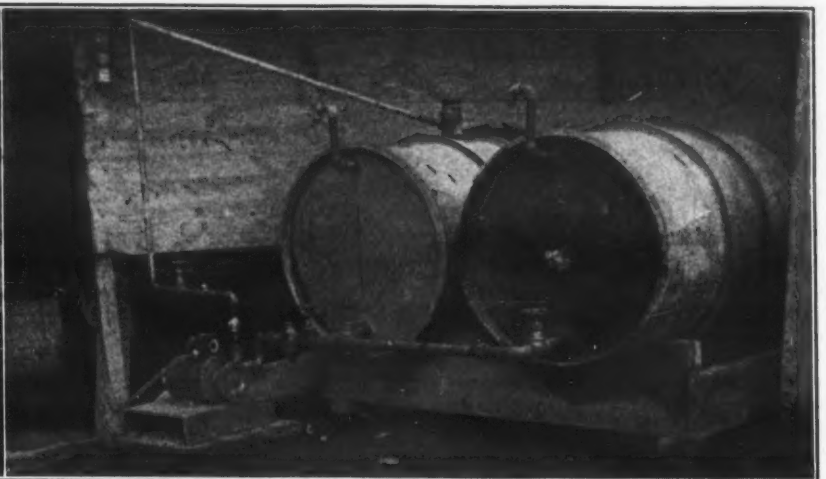
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Here's the concrete batching and mixing plant, downstream about 500 feet from Center Mill Dam. Aggregate enters the plant at the top over a long conveyor belt from the near-by crushing and screening plant. In the foreground is a truck carrying a Stuebner 2-yard concrete bucket. The drums in the right-hand photo are set up at the foot of the concrete batching plant to store liquid Darex AEA. The pump at left sends the air-entraining agent to a reservoir up in the plant where it is introduced into the mixing water. The diagonal pipe line is an overflow line which returns the Darex AEA to the storage drum if the float switch in the reservoir should fail.

four Koehring 2-yard non-tilting mixers, grouped in a circle on the floor below. The mixers have seen much service, but at the time of the awarding of the contract newer tilt-type mixers could not be obtained.

Water for the many needs of the entire project area is pumped from the river into a settling basin where it is chlorinated. Then it is pumped around or hauled in tank trucks to storage tanks over the job. The mixing water is pumped through a 4-inch line to a 1,000-gallon tank at the batch plant where it flows by gravity into the mixers.

The water is not cooled, and in the summer its temperature rose to 80 degrees; the temperature of the concrete, even with the heat of hydration, did not exceed 125 degrees F. During the winter the water is heated to about 60 degrees F by live steam, and tarpaulins are hung over the concrete. A Johnson graphic recorder gives a complete record of each batch; the weights of the materials and even the temperature of the mix are recorded on a chart.

Along the outer 5-foot faces of the concrete dam the mix contains $4\frac{1}{2}$ bags of cement to the cubic yard, with water added at the rate of 6 gallons per bag of cement. The great inner mass of concrete is mixed with $3\frac{1}{2}$ bags to the yard, with $7\frac{1}{2}$ gallons of water per bag.

The dry weights in pounds of typical batches of both classifications are as follows:

	$4\frac{1}{2}$ Bags Per Yard	$3\frac{1}{2}$ Bags Per Yard
Cement	846	658
Sand	1,750	1,930
$\frac{3}{4}$ -inch stone	1,000	1,040
$1\frac{1}{2}$ -inch stone	940	810
3-inch stone	1,470	1,580
6-inch stone	1,990	1,970
Water	450	440
Totals	8,446	8,448

The use of air entrainment began at this project in August, 1947. The agent in use is liquid Darex AEA, which is introduced into the mixing water at the concrete batching plant by an automatic dispenser. The contractors are obtaining 4 per cent air entrainment, with an appreciable decrease in the amounts of water and fine aggregate required.

The agent is stored in two 100-gallon drums connected by a common manifold leading to a small centrifugal pump. Drums and pump are set up at ground level at the foot of the concrete batching plant. Up in the plant, about 60 feet above ground, is a smaller 30-gallon-drum reservoir. The pump maintains a constant level in this reservoir by means of a float switch mounted in the reservoir. An overflow line from the reservoir returns the liquid to one of the storage drums in the event that the float switch should fail; and to prevent freezing at night, the entire contents of the reservoir can be drained back to the storage drums.

Handling the Concrete

Usually only three mixers are working at one time, and they discharge di-

rectly into Stuebner 2-yard bottom-dump concrete buckets which are

carried on trucks. Seven Ford and Chevrolet trucks, on an average, haul

the batches from the plant to the cranes. (Continued on next page)

ditchdigger

backfiller

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in 1 package

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Converting the unit from Backhoe to Overhead is simplicity itself. Boom and bucket can be attached in an hour and detached in 10 minutes. Shovel arms and bucket can be attached and detached equally fast.

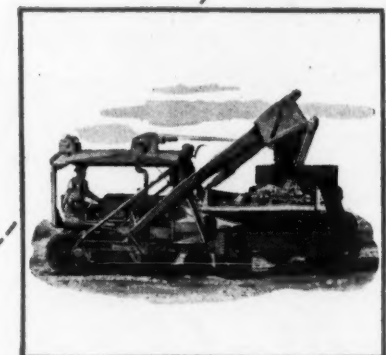
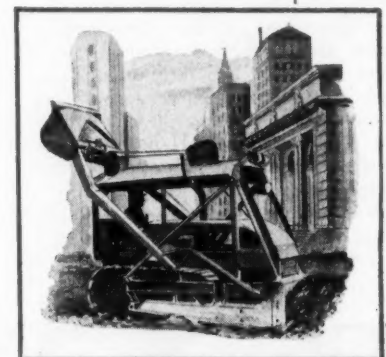
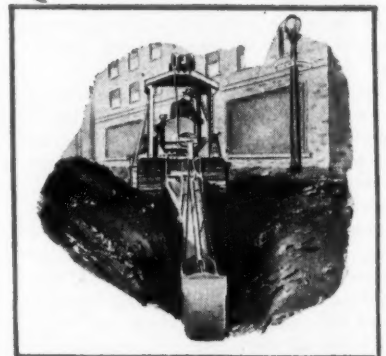
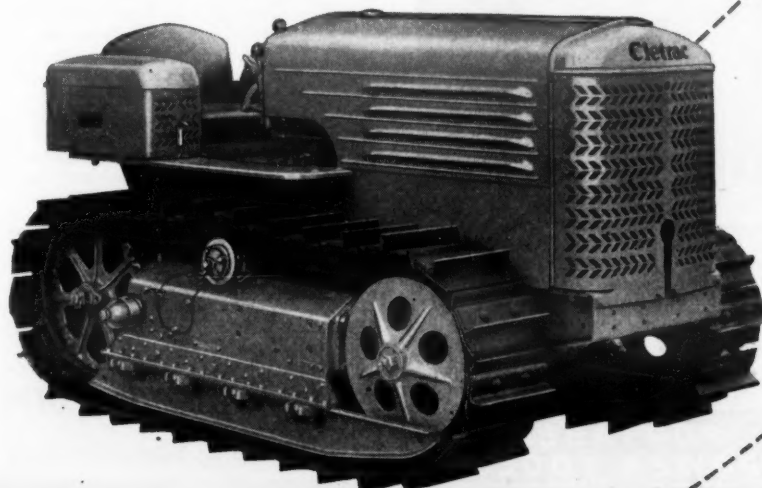
When you're not ditch-digging, this unit can be used to load sand, gravel, stone, debris or snow.

For all the facts, see your Oliver "Cletrac" dealer or write The OLIVER Corporation, 19300 Euclid Avenue, Cleveland 17, Ohio

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Three Cranes Place Concrete in New Dam

(Continued from preceding page)

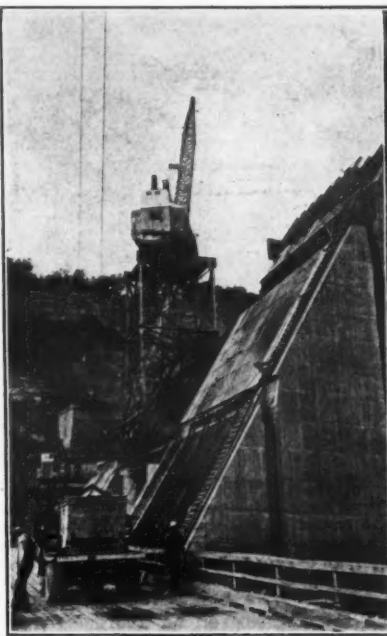
The trucks run through the batch plant on a dirt fill which circles the tower and continues out to the wooden trestle. At the dam an American Revolver crane—there are three on the job, with 125-foot booms—sets an empty bucket on the back of a flat-bed truck; then it picks up the loaded bucket while the truck returns the empty bucket to the batch plant.

At the plant the truck backs into a bumper block which pushes the empty bucket forward so that when it gets loaded with concrete the concentrated weight will be forward, and over the center of gravity of the truck. The average haul to the point of delivery is 1,000 feet.

The work trestle, built across the downstream face of the dam, has a 20-foot roadway with a platform turn-around at each end. The trucks enter and leave the trestle at the center. On each side are curb guards and railings, and a catwalk on the outside for personnel. The trucks replaced a narrow-gauge railway which was used in the early stages of construction to transport the concrete. The trucks have greater flexibility and are more efficient, especially since the pouring is going on at different levels in the various monoliths.

The steam-driven oil-burning cranes can swing 360 degrees on their 20-foot-diameter circular track foundation. In the early stages of work the cranes worked from rails at ground level. As the dam rose, they worked from 6-foot-diameter concrete columns, four to a crane, laid out in a 20-foot square. Concrete was used since steel could not be obtained with which to build towers. Where they did not interfere, the concrete columns were left in the structure.

Later, when steel became available, gantry towers up to 60 feet in height were constructed. As the cranes usually operate from recesses in the downstream face, the legs are unequal in length. The cranes move along from one monolith to another on rails which were set on 30-inch H-beams, supported on either the concrete columns or the dam structure itself. When a crane is ready for a move to a higher set-up, one of the other cranes lifts it into position.



C. & E. M. Photos

At left an American Revolver crane lifts a Stuebner concrete bucket from a truck after leaving an empty one. At right are the downstream face forms for monoliths 4 and 5.

The left-bank half of the dam was poured first, within the first-stage cofferdam which enclosed the left-bank non-overflow section, the power-intake section, and part of the spillway section.

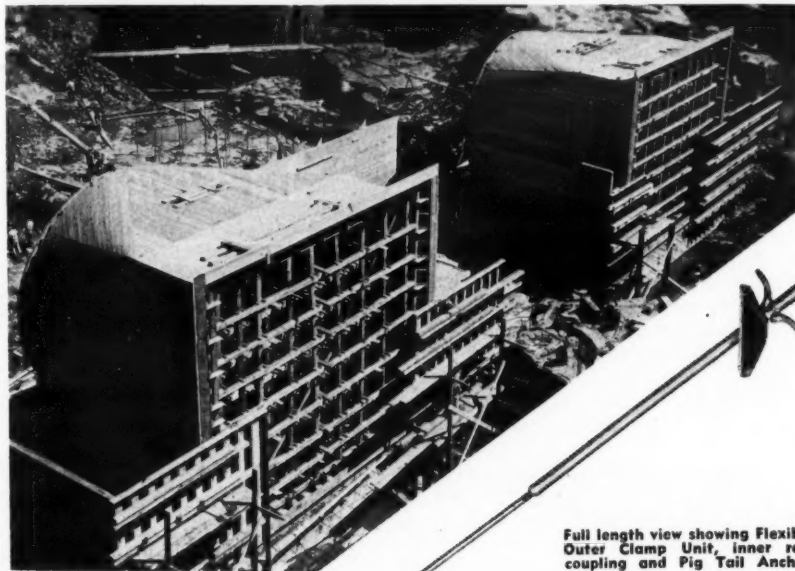
Wooden Forms Used

The dam is divided into 29 monoliths. These measure 40 to 60 feet along the axis, and from a maximum of 187 feet between faces at the bottom to 30 feet in some of the top monoliths. Alternate monoliths are poured in 5-foot lifts from the foundation of tight limestone rock on up to the top. A lapse of 120 hours is required between all adjoining pours. The concrete is placed on a 5 per cent upward slope from the upstream to the downstream face.

Wooden cantilever-type forms are used. They are made of 2 x 6 tongue-and-groove stock, set vertically in panels 5 feet high and either 10 or 20 feet long. They are backed by four 3 x 8 horizontal studs, equally spaced, with the 10-foot-long cantilever arms acting as wales. The arms consist of double 8-inch channels back to back on 5-foot centers.

All the form panels have had to be rebuilt or replaced from the wear they have received. If an adjoining monolith has been poured to such a level that

(Continued on next page)



Full length view showing Flexible Outer Clamp Unit, inner rod, coupling and Pig Tail Anchor.

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insufficient depth is available to clear the cantilever arms, the form panels have been used in reverse. What is then the bottom of the form is secured to the previous lift by bolts through the ends of the wales into the concrete. The panels in the section are tied together lengthwise by hog rods. The tops of the forms are anchored into the freshly poured concrete with hairpins. The panels are raised for the next lift by a series of A-frames and hoists.

As soon as the crane deposits 2 yards of concrete in the forms from the bottom-dump bucket, the pile is leveled off by a Chicago Pneumatic 2-man vibrator with a frequency of 7,200. In each monolith are also two Mall vibrators; these are used along the forms, and to consolidate the seams between the deposits. The top of the concrete is also vibrated by a platform or surface vibrator made by the contractor, and resembling a vibrating screed used in concrete-pavement widening.

When the concrete has acquired an initial set, it is cut back with an air and water hose to dislodge small or loose pieces of aggregate and insure a good bond with the next lift. Curing is done with water, sprayed on the top of the concrete from perforated pipes laid over the surface.

Two shifts are usually worked by the concrete crews: the first from 7 a.m. to 3:30 p.m. and the second from 3:30 p.m. to 11:30 p.m. Three shifts are usually worked a couple of days a week in order to finish a monolith. An average of 12,000 cubic yards of concrete is placed in a week. Total concrete in the dam is 934,000 yards.

Three 20-foot-diameter penstocks on 58-foot centers have been constructed into the power-intake section of the dam. Bethlehem Steel Co. fabricated and erected them. In the spillway section, six 6 x 4-foot sluice gates, supplied by Phillips & Davies of Kenton, Ohio, have been installed. The main sections of the dam are not reinforced; but steel reinforcing is used around the cable tunnel, in the bucket-type stilling basin, the retaining wall around the embankment, and spray walls. The material was furnished by McCarthy, Jones & Woodard of Nashville, Tenn., and it was delivered to the job by truck.

Features of Dam

The non-overflow section of the concrete dam next to the earth embankment is 400 feet long. Adjoining that is the 267-foot power-intake section which is flanked by the 470-foot spillway section with crest elevation 648. Nine piers, 10 feet wide, support the roadway bridge and operating machinery for eight radial-type Taintor gates, 37 feet high x 50 feet wide, which are to surmount the crest. Each gate will be operated by an individual electric hoist. The gates are not included in this contract.

Another non-overflow section, 245 feet long, connects the spillway section with the right abutment. Across the full length of the dam, which will have an elevation of 696, a 24-foot pavement will be laid; this will connect with the access road constructed from Silver Point, Tenn., to the project site. The new road will also serve as an alternate route for Tennessee 56, which now crosses the river about 15 miles upstream from the dam.

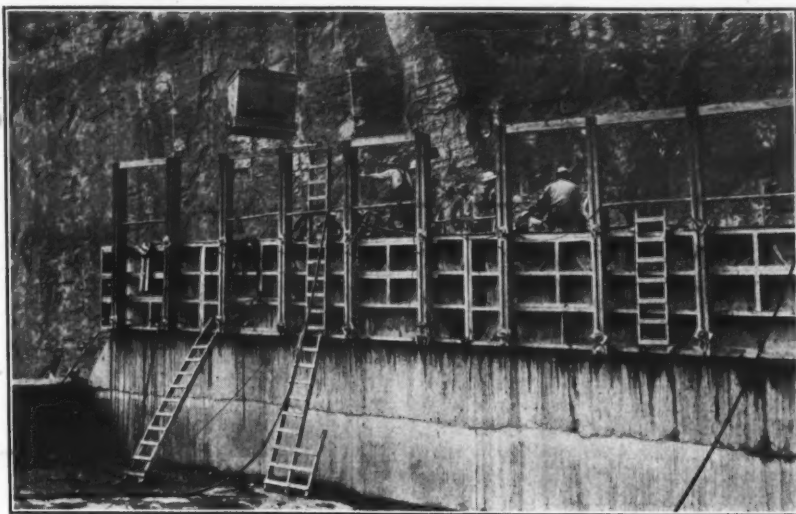
Only two of the three penstocks in the power-intake section will be used in the initial power installation. The two turbines will each have a nominal 62,500-hp rating at a 160-foot head, and the generators will be classified at 45,000 kw each. The total installed generator capacity will be 90,000 kw. Ultimately this will be increased to 135,000 kw when the third unit is put in. Neither the powerhouse, electrical equipment, nor switchyard are included in this contract. The estimated net operating heads are:

Ordinary maximum, with full power pool	169 ft.
Extreme maximum, with full flood-control pool	206 ft.
Average for power	160 ft.
Minimum, with full drawdown	134 ft.

The reservoir formed by the dam will back up the Caney Fork River 64 miles, 10 miles up Falling Water River, and also up other streams in De Kalb, Putnam, White, and Warren Counties. At elevation 685, level with the top of the Taintor gates on the spillway, the reservoir pool will cover an area of 23,060 acres, with a total capacity of 2,092,000 acre-feet. This great volume of water is classified as dead storage, power drawdown, and flood control as follows:

	Acft-Feet	Inches of Run-Off	Area Acres
Dead storage (below El. 618)	838,000	7.16	14,590
Power drawdown (El. 618-648)	492,000	4.21	18,220
Flood control (El. 648-685)	762,000	6.52	23,060
Total	2,092,000		

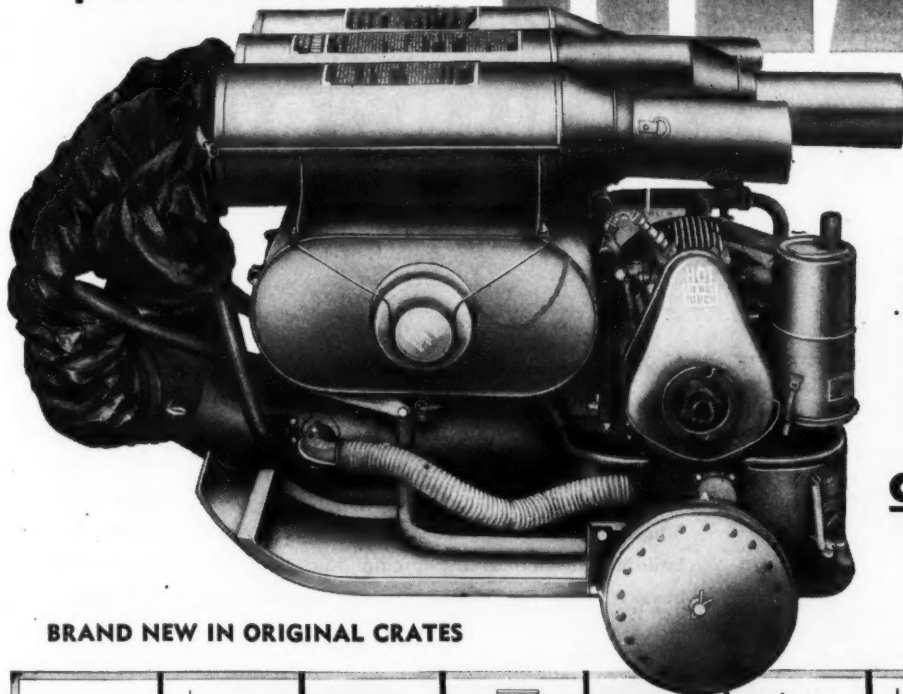
The dead storage will be the minimum pool maintained for recreation and conservation purposes. From that top (Continued on next page)



C. & E. M. Photo

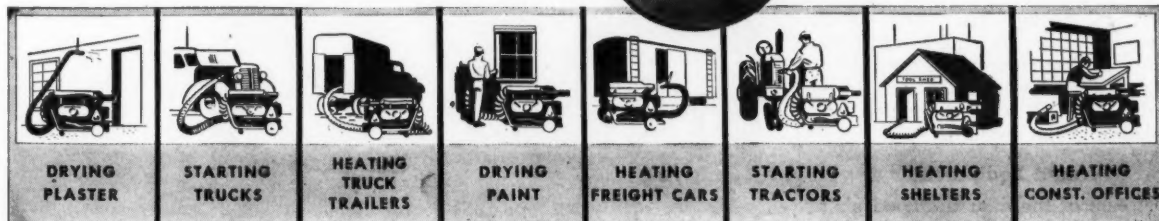
This view shows the wooden cantilever-type forms at monolith 4 at Center Hill Dam in north-central Tennessee. Because the adjoining pour is too high to clear the cantilever arms, the forms have been reversed. Their lower parts are bolted into the previously poured concrete; their upper parts are tied into the fresh concrete with hairpins. Hog rods are used to tie the panels together lengthwise.

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Three Cranes Place Concrete in New Dam

(Continued from preceding page)

elevation of 618 up to 648, the spillway crest, the water will be available for power drawdown. Everything above the spillway crest is considered as flood control. Maximum high-water elevation is 691.

Earth Embankment

The total embankment on the project required the placement of 2,600,000 cubic yards of dirt. Of this amount 430,000 yards went into the construction of a saddle dam, and the rest was for the main embankment. The saddle dam fills in a low area in the topography east of the main structure and about 1,200 feet off the right bank of the river. It will be a part of the rim of the reservoir, and has a maximum height of 110 feet to elevation 696, with a 35-foot crest. The side slopes are 3 to 1 through 2 to 1, and the upstream face is covered with 3 feet of riprap.

Along the top, the main earth dam connecting the left non-overflow concrete section with high ground at the end of the flood plain is nearly 800 feet long; it has a maximum height of 180 feet. The 35-foot crest is at elevation 696 also. The side slopes vary between 3½ to 1 and 2 to 1. The upstream face is covered with 3 feet of dumped riprap from elevation 615 to the crest, and placed on top of a 12-inch sand and gravel blanket. Through the base the embankment has a maximum width of 1,000 feet.

The earth work was sublet to the Ralph E. Mills Co. of Roanoke, Va., and Blythe Bros. of Charlotte, N. C. Material for the impervious rolled fill was obtained from silty-sand or clay-silt borrow pits located upstream from the dam on both sides of the river. The pit on the right bank was reached over a work bridge built about 1,000 feet above the dam. The bridge has three timber and stone crib piers spanned by I-beams which can be lifted out in times of high water. Most of the material came from the right side, but it was usually closed off when the river rose; borrow was then taken from the left-bank pit, on the same side of the river as the earth dam.

From June 1 to October 15, 1946, a total of 1,270,000 yards of material was moved and placed in the main dam, leaving 900,000 yards to go for 1947's operations. No dirt was moved from the autumn of 1946 until June, 1947, because of the heavy rains which saturated the grounds through the fall, winter, and spring. The rising waters also made the borrow pits inaccessible. Progressing last summer at the rate of 8,000 yards per day in two 9-hour shifts, the dirt-moving was scheduled for completion in the autumn.

Varied Equipment

Upstream of the dam the flood plain is on the right bank, while at the dam the flood plain is on the left bank of the river. One of the right-bank borrow pits is located in this wide flood plain where the material is somewhat coarser than in the other right-bank pit which is on higher ground.

The flood-plain borrow pit was worked with a Euclid loader and a fleet of 20 bottom-dump Model F Euclids, which carried an average load of 13 yards of the usually wet and heavy brown silty clay. First a 3-prong Le-Tourneau K30 Rooter pulled by a Caterpillar D8 tractor loosened the soil. Then the Euclid loader, also pulled by a D8, moved over the pit in long rows, making a cut about 4 feet wide and 15 inches deep. The 54-inch belt on the loader is driven by a Cummins 150-hp diesel engine, and a 10-foot clearance is provided under the discharge end of the belt for loading the Euclids. The average loading time of these big rub-

ber-tire wagons is 30 to 35 seconds. An International TD-18 tractor-dozzer cleaned up the pit, smoothing out the banks, and leveling the cut areas. The average haul from this pit was 3,500 feet.

On the hillside borrow the contractors employed six Super C Tournapulls, averaging 12 yards a load, for hauls approximating 2,500 feet. Four D8 pusher tractors were available to help in the loading. On higher ground where there was some rock outcropping, excavating was done either by a Lorain 1½-yard or a Marion ¾-yard shovel. The material was moved by the bottom-dump Euclids or by three end-dump Euclids, the latter averaging 10 yards a load. These hauls averaged 3,500 feet, but some of the material was moved as much as a mile. The free-haul distance was 2,500 feet, with over-haul being paid for in 1,000-foot increments over that limit.

A cut-off trench was first dug to rock along the axis of the earth dam. This

(Continued on next page)

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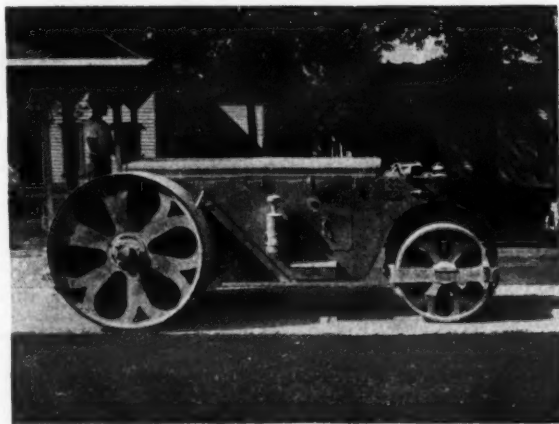


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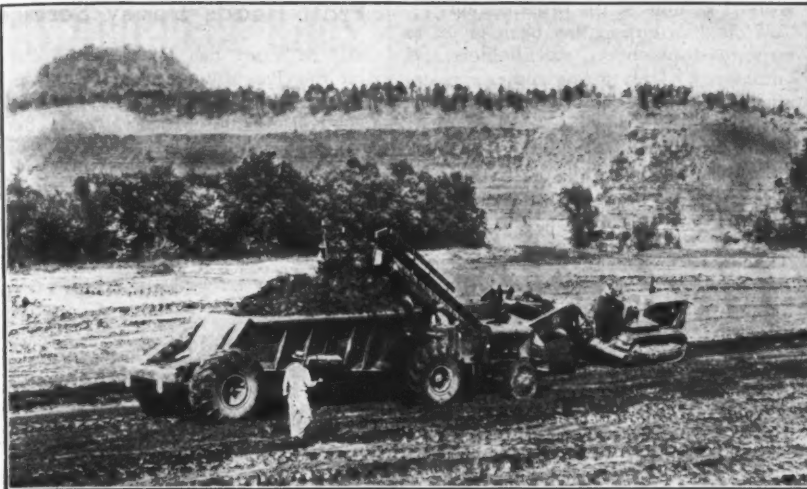


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and
MAINTAINERS



Some 2,800,000 cubic yards of dirt went into the earth embankment sections of Center Hill Dam. In the borrow pit shown at left, a Euclid loader delivers about 16 cubic yards of heavy wet clay to a Model F bottom-dump Euclid for haul to the fill. At right, a Lorain 1 1/2-yard shovel loads a bottom-dump Euclid with 13 yards of dirt.

was grouted with a 2-stage curtain, 75 feet deep, and then backfilled with impervious material. Because of the varying coarseness of the material coming from the borrow pits, the dirt was blended as it was placed on the fill. This was done by having the different earth-moving units unload in windrows as long as possible. Two dozers on a TD-18 and a D7 mixed and spread the dirt in 9-inch loose layers, which were compacted into 6-inch lifts. The windrows were normally parallel to the axis of the dam to avoid the formation of ruts and accompanying strips of uncompacted material. Generally the clay and silt were wet enough so that little water had to be added. Two 2,000-gallon tank trucks were available, however.

Compaction Standards

The density of the rolled fill was required to equal 95 per cent of the maximum density possible with that type of soil, as determined by the calibrated-oil method. This was more than obtained by pulling four McCoy sheep-foot roller drums, two in a row in tandem, over the lifts with a D7 tractor. The required six passes of a sheep-foot roller resulted in an average compaction of 98 per cent maximum density. The contract contained a pay item for additional rolling but this did not have to be done.

When the sheep-foot rollers were through with a section, two Caterpillar No. 12 motor graders bladed over the rough upper crust. This left a smooth surface and also served to keep moisture in the dirt and avoid a too-rapid drying out within the fill.

For night work a series of Kohler 5-kw light plants were scattered over the entire project area. They were

mounted on skids and had 25-foot timber towers on which were mounted three 1,000-watt lights. Standard Oil

of New Jersey gasoline and diesel fuels were used on the job.

(Concluded on next page)

COMPLETE CORE DRILLING SERVICE

for foundation testing, prospecting
and all types of exploratory work



World-wide service! CORE DRILLING by Contract

Whether you wish to prove your property's value, prospect new fields or determine foundations, experienced Joy crews are prepared to make test borings for you . . . quickly and economically . . . any place in the world.

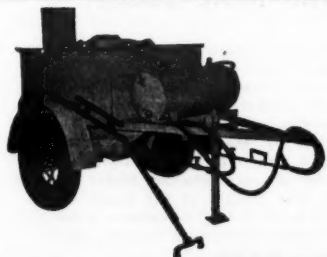
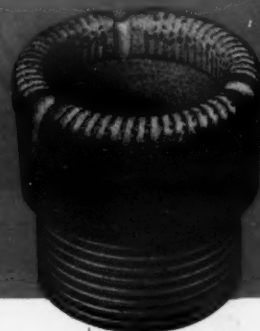
*Consult a Joy Engineer
or write for complete details*

JOY 22-HD CORE DRILL

Conservatively rated at 1750 ft. capacity with "E" rods, the 22-HD is built for drilling in all formations. Compact design and modern lightweight alloy construction assure its portability.

SUL-SET DIAMOND CORE BITS

The ridge design of these bits allows faster drilling speed and produces unusually accurate cores.



HEATING KETTLES FOR ASPHALT AND TAR

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Hand and Motor Driven Spray

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CONCRETE VIBRATORS

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SULLIVAN DIVISION

JOY MANUFACTURING CO.

GENERAL OFFICES: HENRY W. OLIVER BLDG., PITTSBURGH, PA.

Three Cranes Place Concrete in New Dam

(Continued from preceding page)

During the hot summer days in the river valley, an adequate supply of drinking water was always available for the workers, who numbered nearly 700 on both concrete and earth work. Kegs of cool, pure, drinking water were placed wherever the men were at work, and water boys also moved about with portable dispensers on their backs. Sanitation was observed with the use of Vortex paper cups. At each keg, Morton salt tablets were on hand, with instructions on their use for replacing the natural salts lost to the body through perspiration.

Some clearing of the reservoir area is now under way by the Wright Contracting Co. of Columbus, Ga., which has a contract to clear 1,100 acres. Ultimately the entire site will be cleared to the 648 elevation line, the spillway crest level.

Quantities and Personnel

The major items in the contract are:

Concrete	934,000 cu. yds.
Earth, borrow	2,500,000 cu. yds.
Common excavation	275,000 cu. yds.
Rock excavation	375,000 cu. yds.
Reinforcing steel	2,100,000 lbs.
Grout holes under masonry	22,000 lin. ft.
Grout holes under embankment	18,000 lin. ft.
Cement under embankment	75,000 sacks
Cement under masonry	48,000 sacks

The prime contractors—Massman Construction Co., Metcalfe Construction Co., and the Gordon Hamilton Contracting Co.—are represented on the project by R. G. Stowell, Project Manager, and his son, R. J. Stowell, Chief Engineer and Superintendent. On the dirt work J. M. Lipscomb was Superintendent for Ralph E. Mills Co. and Blythe Bros.

For the War Department, Corps of Engineers, R. W. McCall is Resident Engineer; T. A. Rydingsvard, Assistant Resident Engineer; and J. P. Dealy, Concrete Technician. The project is under the supervision of the Nashville District which is headed by Col. Howard V. Canan, District Engineer, with Major William L. Benton as Executive Assistant, with headquarters at Nashville, Tenn.

Excavator-History Booklet

A 68-page catalog which covers its history in the excavating industry has been prepared by the Bucyrus-Erie Co., Box 56, So. Milwaukee, Wis. The booklet starts out by describing some of the earliest known excavators and traces the development to the present-day equipment being built by B-E.

This system is followed throughout the catalog. Where available, pictures are included of early models, and their operational capabilities are then compared with present models. Units described in this manner include shovels, dredges, draglines, wheel scrapers, earth drills, and other equipment for use in war and peace.

The catalog is full of photographs showing B-E excavators in use through

the forty-eight states and foreign countries; in all weather; and on many varied jobs. Photographs also show the company's plants, and a section of the bulletin is devoted to the relationship enjoyed between labor and management in the B-E family. There is also

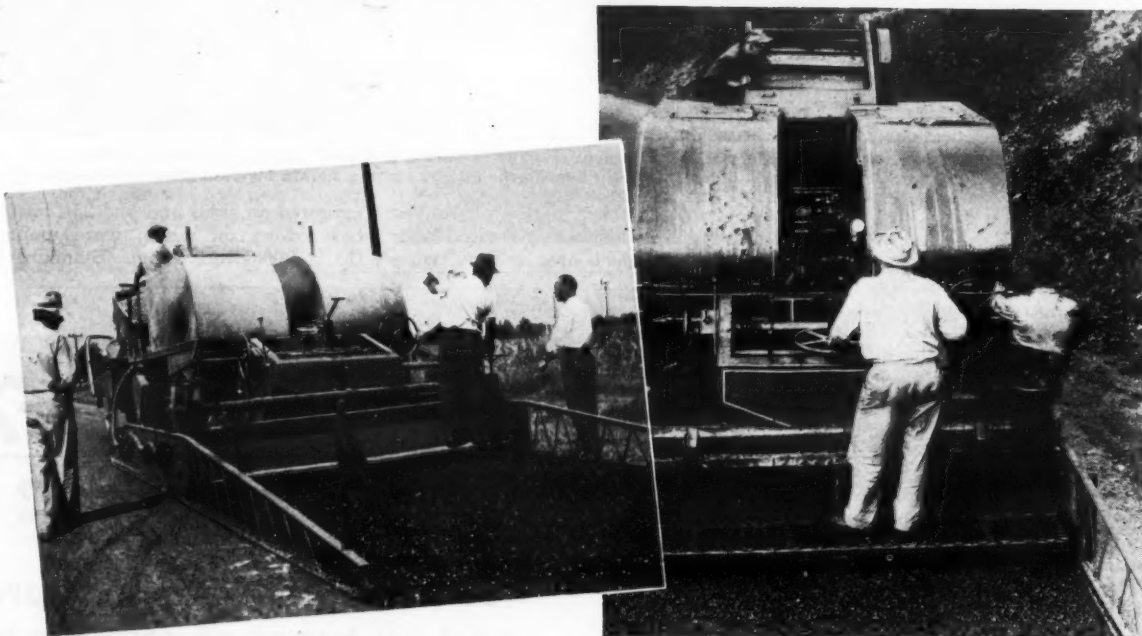
a short resumé of the organization.

Wide distribution has been given to customers, prospects, stockholders and employees. Only a few copies remain, and interested readers writing on their business letterheads may obtain copies while they last.

Pratt Heads Davey Service

H. A. Pratt has been named Parts and Service Manager, according to a release from the Davey Compressor Co., Kent, Ohio. Mr. Pratt has been with the organization for over 20 years.

H & B Moto-Paver



Does the Complete Mixing and Paving Job

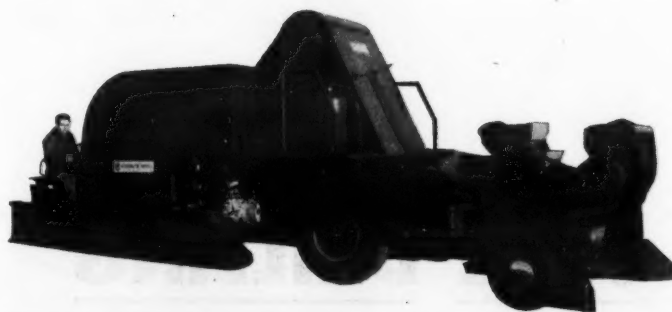
The H & B Moto-Paver does the complete mixing and paving job in one continuous operation. The mixed material is delivered, spread and struck off on the road surface, ready for rolling. The strike-off blade is adjustable to hold accurately to the specified grade and crown. The strike-off mechanism is supported independently on runners 25 feet in length, in-

sureing a smooth, non-wavy surface even when resurfacing over rough or irregular pavement.

The Moto-Paver has been successfully operated using gravel, stone or slag aggregates, and with most types of emulsions, including RC, MC and SC asphalt and tars.

Bulletin MP 47, giving complete information and specifications, will be sent on request.

HETHERINGTON & BERNER, Inc., 731 Kentucky Avenue, Indianapolis 7, Indiana



The Moto-Loader

Where it is necessary to use aggregate windrowed on the road surface, the Moto-Loader may be used in conjunction with the Moto-Paver. This unit is small, inexpensive, and readily portable. It is propelled by the Moto-Paver, and is equipped with a 25 H.P. air-cooled engine for driving gathering flights and bucket line. Height of the blade with relation to the road is adjusted by a simple hydraulic mechanism assuring clean pick up at all times.

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MARTIN CARRYHAUL TRAILERS "Make Hauling A Pleasure!"

Ease of loading, dependability and economical operation are three Martin CARRYHAUL Trailer characteristics which make them the leaders in the field. Regardless of your hauling job, there's a proper size Martin CARRYHAUL Trailer to do it for you safely and economically.

"While There's Life There's Hope"

Give HOPE to the 1 in every 8 persons now doomed to die of cancer, and to their families as well.

Send check or money order to

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85 Franklin Street, New York 13, N.Y.

BR Engineer Aims Safety at Workers

Says Serious Gap Exists Between High-Up Policy And the Men Who Suffer The Accidents on Jobs

† NO safety engineer ever lived who could stop accidents from a desk.

That is the considered opinion of H. P. "Jim" Vogt, Safety Engineer for the U. S. Bureau of Reclamation on its great 100,000-acre Riverton Reclamation Project in Wyoming. Jim Vogt ought to know. For he has come to admit rather candidly that the effectiveness of his safety program is exactly proportional to the amount of time he spends away from his office.

Vogt likes people. He likes nothing better than to mingle with a crew of workmen at lunch time, out on a job. He is sympathetic to their interests. It goes without saying that he does not consider himself either a super accident-prevention analyst or an inspector. Working somewhere between safety policy-making and the horror of the actual accident, Vogt has found what appears to be fertile ground for accident prevention. That territory is in the gang, with the men.

Despite the fact that the Riverton Project is immense, with several contracts and routine Bureau of Reclamation activities constantly under way, Vogt has found that policy, posters, meetings, reports, and all the other various measures for safety mean little or nothing without the friendship and cooperation of men in the gangs.

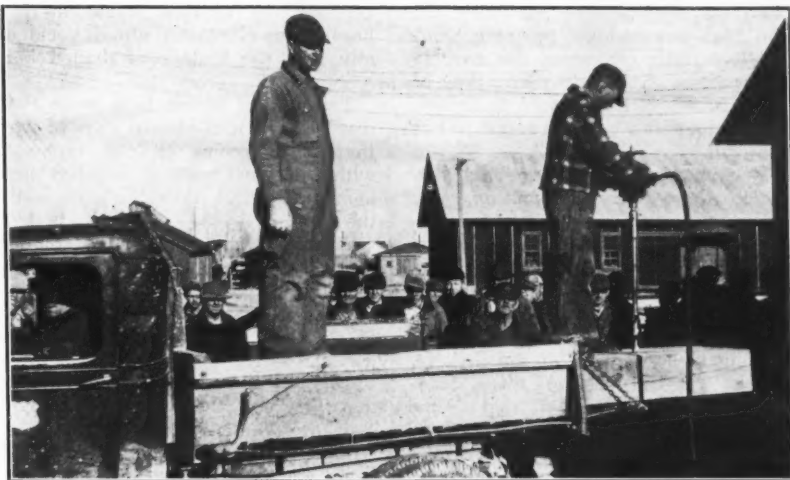
Reveals Fundamental Secret

Vogt has a little secret, so simple in its soundness that many safety engineers never stumble onto it. "Be alert, be friendly, help men to make jobs really safe, and they will be your best advertisement from then on."

He has come to believe that men have an innate desire to work safely. However, there are reasons which frequently make it impossible for them to do so. Sometimes the men themselves do not recognize hazards. Frequently the modern trend towards more production at the expense of accident prevention thwarts that desire. More often than anyone realizes, men work haz- ardously because they are forced to work haz- ardously.

For example, one shovel runner had tried unsuccessfully for months to have a ladder built for his oiler. He ran the risk of a bad rupture every time he tried to grease certain fittings at the rear of his particular machine. The excavation foreman agreed that a ladder ought to be built, but nothing was done.

One day at noon, while Vogt was



U. S. Bureau of Reclamation Photo

It took a friendly safety engineer like Jim Vogt to discover that the men were secretly afraid of a power drill. Here a gang on the Bureau of Reclamation Riverton Project watches a foreman demonstrate the safe way to handle it.

chatting with the shovel runner, the man confided in the safety engineer.

Jim Vogt immediately had the ladder built . . . and made a friend. Now he

knows he can depend on the cooperation of that man.

But until the crews realized that Vogt was not just another safety engineer anxious to hang up a record, they reserved their friendship and cooperation.

Hello

Vogt started out by keeping silent for two months after coming to the Riverton Project. Once, when a supervisor said glowingly, "Glad to see you here; now we can have a safety meeting", Vogt replied, "We will have no safety meetings until we have something constructive to offer".

After weeks of visiting with men, of making friends, of demonstrating that his interest was genuine, Vogt put this notice in the "Headgate", the project publication which all hands read:

"I want you to know that my title is not 'inspector'; and most certainly I do not wish to inspect to anyone's embarrassment or demerit. But I do hope to do my work constructively, and my

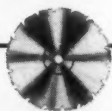
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More Cuts per Hour
FOR MORE HOURS

Here's a common experience of contractors all over the country: When they switch to Atkins "Silver Steel" Saws in their portable power machines, cutting output goes up—man hours and blade costs go down.

Atkins Saws cut faster, straighter, cleaner. They run cooler even in gummy wood. Made with famous Atkins "Silver Steel", they keep the razor-keenness that means smoother cutting for longer periods between blade changes. That means lower blade costs.

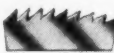
Whether it is rip, crosscut or mitre, there is an Atkins Blade to zip through the toughest jobs in less time. When you switch to Atkins you put new life in your power saws. Write for full information today.



Atkins No. 37 Mitre Tooth Saw, shown above, is a combination rip, crosscut and mitre saw—highly popular with users of portable machines. Pictured below are two of the many other available tooth styles.



Rip tooth for smooth, high-speed ripping.



Crosscut tooth, for fast, easy crosscutting.

NOTE: While Atkins does not manufacture portable machines, many leading machine manufacturers look to Atkins for blades.

**HOISTS
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A Complete Line of Builders' Derricks and Winches—nationally known for dependable service and long life.

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MAKERS OF BETTER SAWS FOR EVERY CUTTING JOB

Handsaws

Crosscut Saws

Circular Saws

Hacksaw Blades

Chain Saws



"Do you see what I see?"

Engineer Aims Safety Program at Workers

(Continued from preceding page)

visits and investigations will be made with the point in mind to prevent accidents—not only the recurrence of a previous one—and to see that an injured workman gets every treatment and right to which he is entitled. I do not intend to run this job from my desk.

"Moreover, I do not know all the answers, but with the help of the foremen we can find them. When I show up on your job, I want you to feel that I'm not coming to find fault; but with your suggestions I can set machinery in motion to make your job easier and safer.

"I want your recommendations and your confidence. Only as I have the good will and cooperation of all, especially the foremen, will our program be a success. It occurs to me that the safety division may help you in getting some things done, which you have recommended, which will make for greater efficiency. In this sort of program I will glory.

"This program includes every contract on the project. Through the contractors I hope to enlist the good will of all foremen. I do not come as someone breathing down your neck, but we want accident prevention."

Thus did Vogt begin. What were the results?

They were 50,000 man-hours of exposure—117 calendar days—without a scratched finger. No fatal accidents: a record that dates back even before Vogt's tenure. The record is good. In making that record, some sobering facts have come to light.

Real Lessons Learned

The biggest lesson of all is that the men of a gang, with their foremen, usually know more about their particular hazards than the safety engineer. The one great problem: to get them to bring these hazards to light, and to make suggestions about their solution.

Jim Vogt tries every method he knows to get these suggestions. For only when solutions come from the foremen and men has he found that any real progress is made towards safety. Often he casually asks a foreman what he thinks of some particularly dangerous situation. Foremen, who know by now that Vogt's interest is friendly rather than critical, instinctively respond with the shamefaced answer, "Well yeah, Jim, I guess it needs fixin', all right; we just never got around to it, that's all."

A friendly safety engineer elicits unusual confessions, occasionally. Not long ago a crew was drilling holes in some particularly hard, waterlogged timbers. It was an operation which went on more or less constantly with the maintenance of irrigation-canal structures.

Vogt noticed that the operation of air hand drills was particularly hazardous,

with the ever-present possibility that the high-powered air machine would get loose. He canvassed the crew for suggestions. Strangely silent, they offered none. Neither could the master mechanic offer a possible frame to hold the drill.

Deciding that here was a hazard for which there was no solution, Vogt called the entire gang together one afternoon and had two operators who were most proficient with the machine demonstrate just how to hold the rig. These old-timers, in the demonstration, unwittingly brought out the fact that they had been scared of the drill for weeks: fearful of the awful consequences if the handle whirled around suddenly when the machine hit a hard knot.

There was an immediate babble of voices. Men who had been silent, previously, blurted out that they too were afraid of the drill. Someone suggested that an air tugger be installed to handle the logs, and that the holes be drilled by a stationary drill press. This sug-

gestion was adopted immediately, a hazard was eliminated almost accidentally, and the footage of drilled holes has jumped.

The goal, of course, is to make every man so conscious of safe ways of work that they become entirely automatic with him. Vogt believes no safety engineer can do this unless he stays out in the gang.

To this end he makes visits, frequent visits. Men have come to expect him to drive up. He is perfectly willing to be used as a scapegoat: to be the man of whom a foreman can say, "Guess we'd better rig this up safe, boys, 'cause Vogt might come around." It is notable that they say this with a grin, now, instead of vindictively.

Safety articles, like safety rules, can go on endlessly, without once preventing an injury. But Jim Vogt suggests that safety engineers cultivate the following attitudes as an experiment:

1. Sincerity. The kind of sincerity that will choose to take 15 more minutes to do a job safely.

2. Awareness and an appreciation of a crew's problems. This can come only through association with the men.

3. Friendliness. There is only one way to achieve it, and that is to be a friend.

Kit for Welders' Use

A case for carrying welding equipment to the job has been brought out by the Air Reduction Sales Co., Dept. 1558P, 60 E. 42nd St., New York 17, N. Y. It provides places for torch, tips, regulators, hose, gloves, goggles, wrenches, and miscellaneous equipment.

The case is made of 22-gage cold-rolled steel with flush double-lock seams. The Airco case has a baked-enamel ripple finish, lift-off tray with handle, heavy-duty bolt catches, and a padlock hasp. It is 22 x 8 x 9 inches in size, and weighs 10½ pounds empty.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 37.

KOEHRING DUMPTOR

No body hoist trouble . . . extra yardage every shift



KOEHRING SHOVELS keep up with DUMPTOR SPEED



Koehring 304 1 1/2 yard Rock Shovel: Heavy Duty loader in 1/2 yard class. Enclosed gears run in continuous oil bath.



Koehring 605 1 1/2 yard Rock Shovel: Exclusive power clutch eliminates operator fatigue. Boom-foot shock absorber permits greater speed in rock.

Grader Attachment Fits Light Tractor

A maintainer attachment for use with the Model No. 70 Oliver tractor is made by Henke Mfg. Corp., Janesville, Iowa. Features claimed for the Henke maintainer include hydraulic controls located beside the driver's seat; ball-and-socket hoist housing; Hydreco pump assembly; special hydraulic blade hoist; circle-seat ball-and-socket assembly; blade-tilting adjustment; draw-bar knuckle and pin assembly; and frame extension for wishbone. The blade angle is adjustable from the driver's seat by means of a special hand lever.

Overall length of the blade attachment is 17 feet 3 inches; overall width in front is 5 feet 2 inches, and 6 feet 9 inches in the rear; turning radius is 27 feet 8 inches. Blades are furnished in 8, 10, and 12-foot lengths, 12 inches high, and $\frac{3}{8}$ -inch thick. Height of cutting edge is 6 inches, and its thickness is $\frac{1}{2}$ inch. Blade clearance at low point is 8 inches; maximum swing right or

left is 63 degrees with a total of 126 degrees.

Operating down pressure of the blade is 10,603 pounds at 750-psi by-pass valve pressure, and the maximum is 14,137 pounds at 1,000-psi pressure. Total weight of attachment and tractor is 6,220 pounds. Extra accessories for use with the attachment include a rotary power sweeper and a V-type snow plow.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 1.

Trucks for Mixing Bodies

New literature describing trucks available for mounting ready-mixed-concrete bodies is being distributed by The Four Wheel Drive Auto Co., Clintonville, Wis. Titled "Mixers on the Move", the folder describes the use of FWD trucks suitable for this type of duty. Capacities range from 20,000 to 38,000 pounds gross vehicle weight. The trucks are recommended by the manu-

facturer for use with mixers from 2 to 5½-cubic-yard capacity.

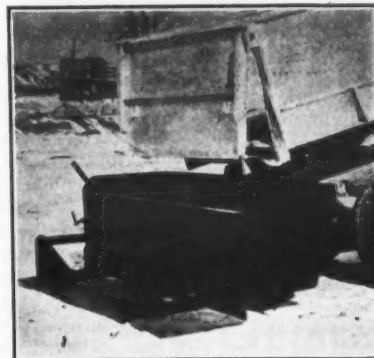
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 84.

Lightweight Ladder

A new type of ladder designed for added strength and safety has been announced by the Duo-Safety Ladder Corp., 809 Ninth St., Oshkosh, Wis. The Type F all-aluminum (Duralumin) ladders are said to feature lightweight and indestructible construction. They are made in various lengths and models.

Features include: expanded rungs, which are electrically welded to the outside channel; a double-rolled head, internally expanded on both sides of the rung plate to prevent spreading; and non-shearing rivets. This exclusive design is called Channel Rail by the manufacturer.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 5.



The Miller bituminous-concrete or aggregate spreader is attached to a dump truck by a bolt-on hitch. Its depth-of-spread range is $\frac{1}{2}$ to 8 inches; maximum capacity is one ton per minute.

Spreader Attachment

A dump-truck attachment for use as a bituminous-concrete or aggregate spreader is made by The Miller Spreader Corp., 120 Pike St., Youngstown 2, Ohio. It comes in two standard widths—7½ and 8 feet—with other widths made up to order. Special bleeder plates provide an additional spread width of 6 inches on each side. According to the manufacturer, the Miller spreader will leave a smooth, level surface regardless of the contour of the base surface. It is said to have a depth-of-spread range from $\frac{1}{2}$ to 8 inches in thickness, and a maximum capacity of one ton per minute.

The spreader is attached to the dump truck by means of a bolt-on hitch which fits on the truck's rear axle housing. The spreader is equipped with hollow tongues having large guide forks on the front with an over-center locking device passing through the hollow tongues and extending back to individual latching levers on the side of the hopper. The spreader is mounted on two pneumatic-tired roller-bearing wheels, with dual wheels available at extra cost.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 41.

Diesel-Engine Oil Filters

A catalog on oil filters for diesel-engine applications has recently been completed by Purolator Products, Inc., 744 Broad St., Newark 2, N. J. Thoroughly illustrated, this 16-page catalog contains scaled diagrams of many types of oil filters made by Purolator for this service.

The description page for each filter contains a detailed specification chart giving all necessary technical information on construction, dimensions, capacity, weight, etc. Also included is a reproduction of the ASTM standard viscosity-temperature chart for liquid-petroleum products.

Another feature of the catalog is a description of the P-type or Micronic element. This element developed by Purolator is said to permit a degree of filtration so fine that it can be measured in microns. It is designed to impregnate selected cellulose with a resin which will withstand high pressures and varying temperatures, according to the manufacturer.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 65.

Lancaster Engg. Corp. Sold

Purchase of the Lancaster Engineering Corp., Lancaster, Pa., has been announced by Irl A. Daffin, President of the new corporation. The company is planning an expansion in its manufacturing of industrial-type hammer mills and distribution of other heavy equipment. The company was purchased from the New Holland Machine Co., with which Mr. Daffin was associated as President. New Holland and its subsidiary and affiliated companies have been purchased by the Speery Corp.

R DUMPS IN 1 SECOND

Pull the release lever and gravity instantly tips the scoop-shaped body 90 degrees. One second later, load is dumped . . . you're ready to go for another load.

You don't waste 10 seconds, 20 seconds, 60 seconds. Kick-out pan keeps body clean in any material.

Because Dumptor has no body hoist, you have no body hoist trouble. Dumps fast even in zero weather. Saves all body hoist maintenance expense.

NO TURN-TIME, MORE HAUL-TIME

You save more seconds every trip, because Dumptor never turns on shuttle hauls. Three reverse speeds are just as fast as three forward speeds. Constant mesh transmission is especially designed for shuttle work.

DRIVE AXLE STANDS UP UNDER SHOVEL LOADING: Dumptor is built by a shovel manufacturer for work with rock shovels. Drive axle is 4" chrome nickel steel, heat treated. Steel case protects

entire assembly. Welded steel body is heavily reinforced. Steering axle oscillates to absorb frame twisting shocks of haul road travel.

EASIEST TO MAINTAIN

Everything accessible. One man can do complete grease job in 5 minutes. Clutch removed in fraction of time it takes to remove a conventional clutch, because engine is not moved, transmission case is not touched. Every gear in transmission is removable through one cover.

YOU'LL NEED FEWER UNITS — IF THEY'RE DUMPTORS

Job studies prove 3 6-yard Dumptors can easily handle shovel output formerly requiring 4 other 6-yard hauling units. Generally, there is a saving of 20 to 25 per cent in number of units on jobs within Dumptor range of haul.

Experienced Dumptor engineers are ready to solve your off-the-highway haul problems.

Contact your Koehring Distributor today.

NO BODY HOIST TROUBLE
because Dumptor has no body hoist. Gravity tips body instantly, returns it automatically when empty.



KOEHRING COMPANY, Milwaukee 10, Wisconsin
Subsidiaries: JOHNSON • KWIK-MIX • PARSONS

Precision Subgrader Cuts by Vibrations

A new development in the road-building field has been announced by the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh 22, Pa. The company has brought out a machine which applies the principle of vibration to the work of excavating subgrades for paving construction. The vibratory subgrader is an extension of research and development which led to the vibratory spreader and the vibratory finisher. The company states that the application of vibration achieves greater efficiency in cutting through the earth or shaving the subgrade material to a given grade and crown.

According to the manufacturer, the new unit will produce an accurate grade, true to crown and cross section. The crown can be adjusted as paving conditions require without stopping the subgrading operations. Tests conducted by the company revealed, it is said, that the vibrating cutting edge will penetrate extremely hard materials without transmitting shock or movement into the road forms.

The Blaw-Knox precision subgrader is provided with a 2-wheel strike-off, which is adjustable for crown and width. The blades of the strike-off are equipped with a control for raising or lowering. The strike-off follows the subgrader at a distance of 6 feet, to permit visual inspection of the excavated subgrade and the completion of minor corrections—such as the removal of undesirable rocks and the addition of materials in spots where the subgrade is so low that the subgrader has no material to cut.

All necessary corrections to the subgrade are made before the strike-off passes over the grade. Fines for filling any small holes or irregularities, and to complete the final screeding-in operation, are provided by small vertical openings in the cutter assembly. The manufacturer states that the vibration of the soil-covered cutter assembly sifts only fine material through these openings and feeds the material to the strike-off on the same principle as a vibrating screen.

Vibrations at 2,000 impulses per minute are produced by generators mounted on the back of the cutter assembly. The cutter is equipped with reversible cutting edges which are insulated from the subgrader. They are made of carbon-molybdenum steel. Impacts of the vibrations are said to flow in a fore and aft direction directly into the subgrade. The subgrader is adjustable for width by moving the end trucks on the main-frame members. Rugged construction is designed to prevent misalignment of frame members and to prevent internal movement which might be transmitted to road forms.

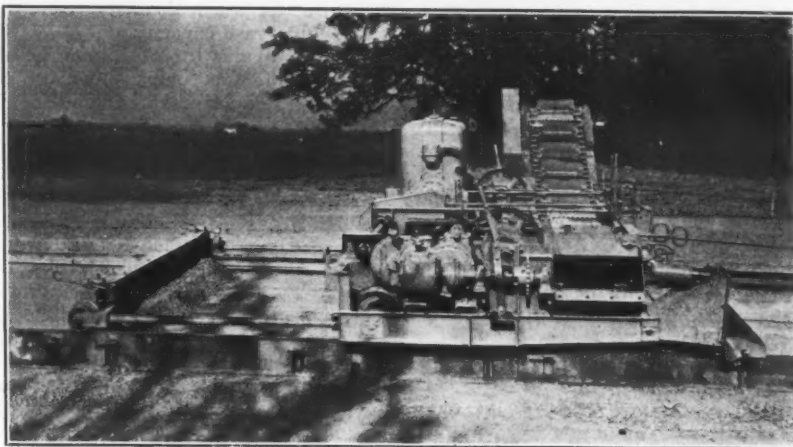
Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 34.

Hydraulic-Brake Lock

A device for locking hydraulic brakes has been developed for Monroe Standard, Inc., Wyandot Bldg., Galion, Ohio. Known as the HydrauLock, it is designed to provide a positive lock-up for all four wheels. When the HydrauLock is on, according to the manufacturer, depressing the brake pedal passes brake fluid through the valve to the wheel cylinders. This fluid is held under pressure—and the brakes automatically are kept applied—until released by the control switch.

The HydrauLock uses standard hydraulic outlet fittings; it is designed to be screwed directly into a master cylinder or booster assembly which uses 5/16-inch fittings, without adaptors or other special pieces of equipment. The unit weighs approximately a pound and is 3½ inches long.

An additional accessory available



Here is a side view of the new Blaw-Knox vibratory subgrader, showing the 2-wheel strike-off which is adjustable for crown and width. The 6-foot space between strike-off and machine proper permits minor corrections to the subgrade.

from Monroe Standard is the Safe-Way pressure control. This is a cylinder designed to provide a storage place for

brake fluid which will hold pressure even under varying temperatures. The brake fluid is released under pressure

when and if it is necessary to maintain proper locking pressures, the manufacturer explains.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 4.

Drafting Template

A drafting template which presents the most commonly used symbols—circle, hex, delta, and square—has been made available by Rapidesign, Inc., P.O. Box 592, Glendale, Calif. It is made of translucent plastic, with numbers printed on the negative side to keep them from wearing off.

The template cutouts on the Model No. 50 Pocket Pal are precision-cut with allowance for pencil point. The device is pocket-size, 3 5/16 x 5 inches with rounded corners. The symbols are scaled from 1/16 to 1 inch.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 19.

Today the DUMPCRETE is hauling concrete in 34 states, Canada, Hawaii

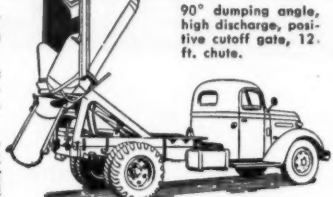


Concrete men all over the country have found out that the Dumpcrete hauls good concrete at low cost.

They have learned how to produce better concrete cheaper with a central mixing plant, air-entrained concrete, and the Dumpcrete.

This low-cost way to produce top-quality concrete is used with great success by ready-mix and building supply companies, by highway and industrial contractors, by house builders and heavy construction concerns, and by local, state and national government agencies.

They are hauling concrete over 45 minutes without agitation and without segregation. They are dumping into buckets, hoppers and forms with-



90° dumping angle, high discharge, positive cutoff gate, 12 ft. chute.

out a ramp. They are placing low-slump, easy-to-work concrete right where it's wanted with a long 12-foot chute.

They are using the Dumpcrete as a utility body, too . . . to haul sand, gravel, mortar, coal and earth.

Their costs are low. Their production is high. No wonder they like the Dumpcrete.

You will want to learn more about the Dumpcrete. Send the coupon today. Early delivery.

DUMPCRETE

Division, MAXON CONSTRUCTION COMPANY, INC.

421 Talbott Building, Dayton 2, Ohio

Please send Dumpcrete information.

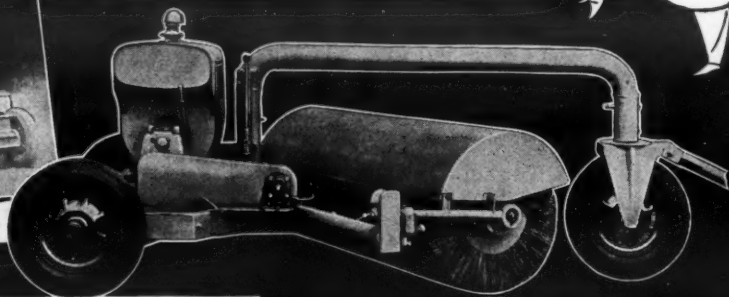
Firm _____ Name _____
Street _____ City _____ State _____

LITTLE JOE SAYS: A New Broom Sweeps Clean and LITTLEFORD BROOMS STAY NEW

Before you apply bituminous materials, sweep the surface really clean with Littleford brooms. Power or traction driven, these brooms sweep in either direction; only two minutes needed to make the change. They're sturdy and tough; hydraulic lift raises and lowers brush to regulate tension. These three wheel brooms turn in small radius. Can be equipped with sprinkler system; one can use two-way blower. Get the whole story on Littleford brooms; ask for Bulletin No. 19.



This Traction Driven Broom gets its power from the rear wheels.



LITTLEFORD

LITTLEFORD BROS., Inc.

485 E. PEARL ST., CINCINNATI 2, OHIO



Loose materials such as sand, gravel, stone, and cinders are handled by this portable trough-type Haiss conveyor. It comes in standard belt widths of 16, 20, and 24 inches, and standard lengths of from 20 to 60 feet.

Trough-Type Conveyor

A portable conveyor for handling loose materials has been introduced by the George Haiss Mfg. Co., Inc., Division of Pettibone Mulliken Corp., 381 Canal Place, New York 51, N. Y. Of the trough design, it is recommended by the manufacturer for such materials as sand, gravel, stone, and cinders, and for handling concrete from mixers to forms.

The Haiss portable conveyor is built in standard belt widths of 16, 20, and 24 inches; and in standard lengths from 20 to 60 feet, in multiples of 5 feet. It can be furnished with electric motor or gasoline engine. Capacity ranges from 60 to 180 tons per hour. Steel or rubber-tired wheels are optional.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 45.

New Lubricating Oils

A line of lubricants for use with construction tools and equipment has been developed by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. According to the company, Sta-Put lubricants are especially applicable to rock drills and other pneumatic tools used in tunnel work, due to the fact that they will not fog. These oils undergo a polymerization treatment during processing which is designed to increase their adhesion to metals.

Other features are claimed for these products: that they can withstand extreme pressures; that they are non-splattering and leak-resistant; that they have a high degree of oiliness; and that they will not gum or corrode the tools they lubricate.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 29.

Plastic Rock Flooring

Literature telling the story of its Plastic Rock flooring can be obtained from the United Laboratories, Inc., 16812 Euclid Ave., Cleveland 12, Ohio. Plastic Rock is a floor-surfacing material composed of Siloxide rock, fibrated asphalt paste, and a tempering or setting powder. It can be applied with the same tools that are used to apply a concrete topping, the manufacturer says.

The bulletins on this material contain complete information on what it will do, where it can be used, its advantages, and other pertinent data. Mixing directions, ordering directions, and complete specifications are also listed.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 56.

New Witco Asphalt Plant

The Witco Chemical Co. of New York City has started construction of an asphalt-processing refinery in Perth Amboy, N. J. To be completed in mid-year 1948, it will specialize in the production of asphaltic materials to meet exact specifications or requirements

including compounding, waterproofing, mastics, fillers, mineral rubbers, battery boxes and sealers, and other miscellaneous special uses. It will also produce a run of general asphaltic materials for paving, roofing, etc.

Replaceable Roller Tips

Tips for sheepfoot rollers, said to be replaceable in the field without welding, are the subject of a new folder issued by the Los Angeles Steel Casting Co., 6100 So. Boyle Ave., Los Angeles, Calif. According to this announcement, the Tamprite shanks and tips are again back in production and available for immediate delivery.

The folder describes how a tip, when it has become damaged or worn, is driven off its shank and a new tip driven on. It also points out that these tips provide a driving fit combined with positive alignment.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 57.

Many Uses for Bulldozers

The versatility of its cable-controlled bulldozers is the theme of a 16-page catalog being distributed by the Caterpillar Tractor Co., Peoria 8, Ill. Bulletin No. 10360 shows the diversified operations possible with the bulldozers mounted on various models of Caterpillar diesel track-type tractors.

The booklet contains many pictures

of the various types and sizes of tractors and bulldozer blades used on varied jobs from coast to coast. Summaries of jobs including levees, dikes and canals, railroad-siding repairs, ferry slips, and road construction and repair are emphasized throughout the publication.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 85.

Let HYDRAULICS lift your equipment use the MONARCH

HY-LO-JACK

FAN BELT DRIVEN

POWER HYDRAULIC CONTROL



Lifts equipment ten times faster than hand pump. Easy installation on new or existing equipment. Hundreds of applications, such as Snow Plows, Sweepers, Power Mowers, etc. Priced for the most conservative budget.

WRITE FOR CIRCULAR N.75

"QUALITY MACHINERY SINCE 1856"

MONARCH ROAD MACHINERY COMPANY, 327-329 Front Ave., N.W., Grand Rapids 4, Michigan

Easier to Handle

Porter-Cable

Speedmatic

SAW

**NO VEERING!
NO TWISTING!
NO TIPPING!**

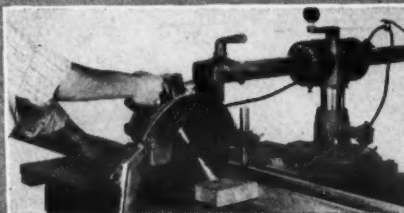
● In a power saw, speed alone is not enough. The question is—does it handle easily? Does it keep straight to line without veering and tipping? Does it cut at any angle and still keep its balance? Does it produce better work?

Once you hold a Speedmatic in your hand, you'll answer every question with a big YES.

Speedmatic cuts straight and fast with less fatigue.

1. It's SCIENTIFICALLY BALANCED for one hand operation.
2. The broad shoe is CORRECTLY PLACED for steady rest. Prevents veering, cramping, twisting and swerving.
3. The blade is UNUSUALLY FAST—whirls around at 7000 rpm! Practically feeds itself without "pushing."
4. It's ADAPTABLE to any angle or depth cutting. Rips, cross-cuts, bevels. Saws mitres . . . does dado cutting. Does not require pre-marking for a square cut.

EXTRA UTILITY FEATURE



Without tools you can attach the Speedmatic to the Porter-Cable Radial Swing Arm . . . Doubles utility of the saw as a slide or rip saw for handling a number of duplicate pieces.

PORTER-CABLE

MACHINE COMPANY

1805-1 N. SALINA ST.

SYRACUSE, N. Y.

SEE!

 THE SPEEDMATIC

today at hardware stores, mill supply houses,
building material dealers!



FORM TRENCH. This is what residents of Chariton, Iowa, saw when they strolled out to the edge of their city the latter part of August, 1947—the beginning of almost 8 miles of new two-lane 22-foot concrete highway on Iowa State Route 14. The men they saw smoothing up a form trench excavated by a Cleveland Formgrader were employed by C. H. Atkinson Paving Co. of St. Joseph, Mo., paving contractor on the job.



FINE-GRADING. Once the Blaw-Knox 10 x 10-inch steel forms were in place, a Flynn Surgrader moved up to skin the grade to proper depth.



EXPANSION JOINTS. At several bridges and other fixed points along the line, crews set expansion joints of 1-inch asphaltic mastic material and 1-inch capped steel dowel bars on 15-inch centers. Contraction joints went into the slab only at the bottom of several steep hills. But a longitudinal weakened-plane joint of $\frac{1}{2}$ x 3-inch mastic was laid along the pavement center line by a Cleft-Plane machine.



PAVER. In the paving line-up, a Koehring 34-E Two batch paver disgorged a 34-cubic-foot batch of concrete every 42 seconds onto the steel reinforcing bars and the asphalt-impregnated paper laid to separate the slab from the graded earth.

SPREADER. Two of these steel arms with wheels at the end were welded to the front of the Jaeger spreader which distributed the concrete. They served to push the longitudinal steel reinforcing bars in the center of the slab against the weight of fresh concrete batches.

State Road Concrete

(C. & E. M. Photos)



PAVING LINE-UP. Chariton "sidewalk superintendent" who to the city limits to watch the paver line-up during August, September, and October, usually saw alongside the 1,000-gallon tank truck which hauled mixing water from a hydrant. Behind the paver, the Jaeger spreader and a Jaeger-Lakewood screed finisher. A Cleft-Plane flexible-joint installer and a Koehring L-10 finisher also worked on the slab.

HAND FINISHING. In back of the machines came concrete workers who dressed the slab with hand floats, pulled a double-belt finish on the surface, and dressed the edges at the form lines. A huge Fercheron named Joe hauled concrete. A 3-inch drain curb built on all low sides of the pavement.





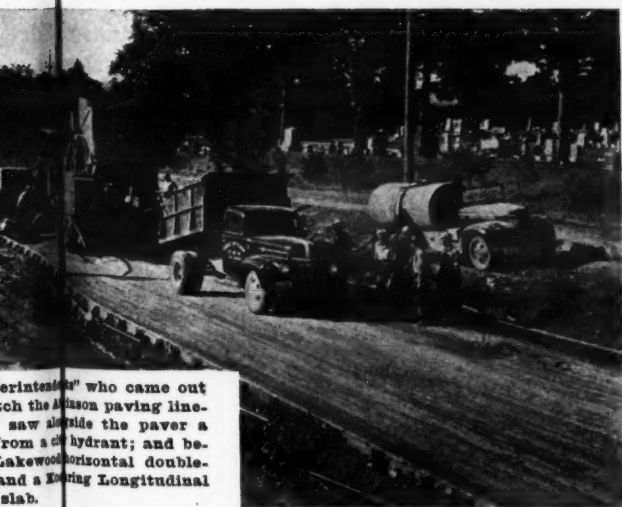
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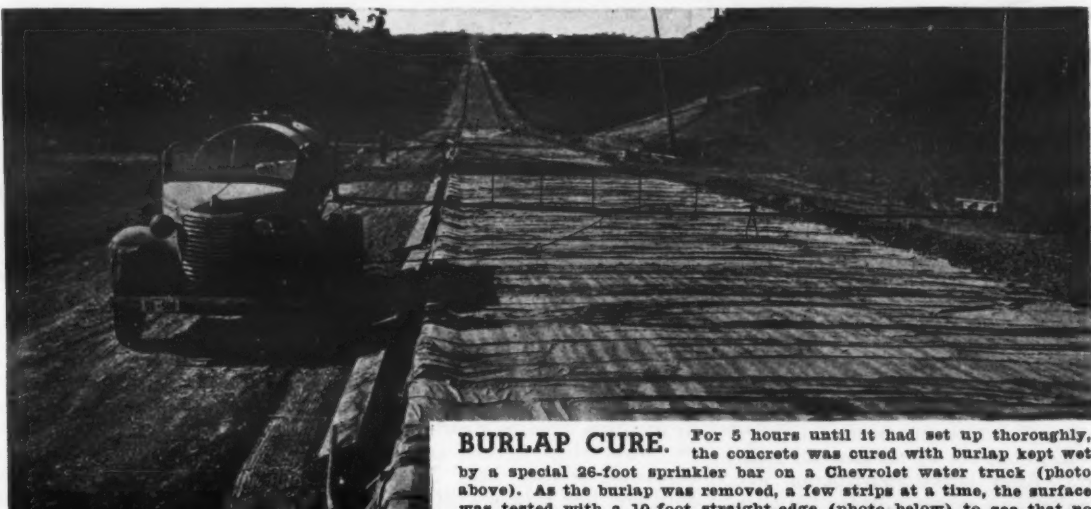
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(See article on page 1)



erintendent" who came out
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saw alongside the paver a
rom a hydrant; and be-
Lakewood horizontal double-
and a Xoring Longitudinal
slab.

lines can concrete finishers
with long-handled steel and
ce, and dressed the concrete
Joe hauls concrete for the
of the pavement.



BURLAP CURE. For 5 hours until it had set up thoroughly, the concrete was cured with burlap kept wet by a special 26-foot sprinkler bar on a Chevrolet water truck (photo above). As the burlap was removed, a few strips at a time, the surface was tested with a 10-foot straight-edge (photo below) to see that no humps or pockets more than $\frac{1}{8}$ inch in 10 feet remained in the slab.



**Average: 1,300 Feet
Every 10-Hour Shift**

SURFACE GRINDING. If there were any high places, they were ground down by a Berg concrete grinder driven by a Wisconsin engine.

FINAL CURE. After the surface was checked and dressed, two spray outfits applied Cecure concrete-curing compound. Every completed section, and every set of forms stripped and moved ahead, meant that Chariton citizens were that much farther out of the mud, that much nearer to being up on paved highways where Iowa wants as many as possible of its residents.



Service Shop At Headquarters

**Equipment-Repair Shop
For Heavy-Construction
Machines Also Handles
Odd Business Sideline**

CONTRACTORS deal in a variety of business enterprises and do many kinds of work. On the west edge of Oklahoma City the grading, bridge-building, and paving firm of Ottinger Brothers has set up an unusual repair shop. After heavy construction jobs, it serves as a repair base for the overhaul of tractors, motor graders, Tournapulls, and concrete pavers. And when the shop is normally idle between jobs, the nucleus force of good men manufactures playground equipment.

E. C. Ottinger and his brother Clyde Ottinger, who direct a current \$3,000,000 contract commitment in four states, say the playground-equipment manufacturing activity doesn't net any profit to speak of. But it does keep the few men busy around headquarters in between overhaul jobs.

History of Shop

Ottinger Brothers is a firm well known in Oklahoma, Tennessee, Arkansas, Missouri, and Illinois for paving jobs, bridge building, flood control, and earth work. Subcontracting under S. J. Groves & Sons of Minneapolis during the war, the Ottingers helped to push the big McAlester, Okla., Naval Base to completion, winning the Navy "E". With expanding contract work a reality, the Ottingers purchased 12 acres of good land near the west end of Oklahoma City in 1945 as an administrative, storage, and repair headquarters.

By late autumn an elaborate brick office building was ready for use, and work was completed at the same time on the present cement-block repair-shop building, 45 x 100 feet in size. With the exception of a small steam-cleaning and washing room and an enclosed grease rack, the remainder of this shop building was left as a heavy-equipment repair shop.

Lay-Out of Shop

The repair building has been developed around the general plan of tearing equipment down, installing new parts, and putting the rigs back together. The shop equipment is therefore not too elaborate. Heavy machining or similar difficult jobs are sent down to Oklahoma City.

Two swinging stationary floor cranes with Yale spur-gear hoists can lift and handle the engines or other heavy parts of any of the equipment. Ottinger Brothers owns and operates about 100 pieces of heavy-construction equipment, including 6 Super C Tournapulls, 9 tractors, 4 motor graders, 9 crawler cranes, 2 low-bed trailers, 2 complete concrete-paving outfits, and a variety of rollers, water wagons, and so on.

Handling of Parts

One section of the repair shop has been set aside with compartmented bins, containing small parts.

Machines in need of overhaul are carefully gone over when they come in to the Oklahoma City shop, and new parts ordered. As for large parts, they sometimes are bought or ordered in advance of actual need so they will be available when the machines get in. These large parts are not, however, stocked.

Of course, mechanics out in the field on jobs with the machines set up their own small field shops. But the operation of Ottinger Brothers' shop and



C. & E. M. Photos

The manufacture of the playground equipment shown at left in front of the firm's office building is only a sideline for Ottinger Brothers. It keeps repair men busy in between overhaul jobs on heavy-construction equipment at the company's headquarters repair shop (right) at Oklahoma City.

field shops is kept flexible enough so that necessary parts can be ordered direct from field to distributor, or so the main shop can be called in for assistance at any time. There is no hard and fast rule, except that equipment be kept working.

Company Supervision

Ottinger Brothers and Mechanical Foreman A. W. Munson keep a close

personal check on the condition of their equipment. With a full-time pilot and a company-owned twin-engine Cessna plane at its disposal, no piece of Ottinger equipment is ever very far from the eyes of its owners. The company has probably the most complete personal representation present in the field of any major contracting organization in the lower Mississippi Valley.

By establishing this headquarters ad-

ministrative and repair set-up, Ottinger Brothers has taken another step towards making the performance of its equipment on a job completely dependable.

The wellbeing of the entire world is essential to world peace. Help the needy of other countries by contributing to American Overseas Aid, 39 Broadway, New York 6, N. Y.

Heavy Duty



GMC heavy duty models are extra tough and rugged . . . heavy duty through and through. They are built that way because GMC is in the commercial vehicle business exclusively, because GMC designers and engineers know the kind of engines, axles, frames, transmissions, clutches and springs that will best perform on every heavy hauling operation. And they prove out that way . . . over-the-highway, off-the-road, or in city stop-and-go.

GMC heavy duty models are available in gross weight ratings of 19,000 to 90,000 pounds and offer wheelbase, engine, and chassis options which permit manufacture of vehicles exactly suited to specific hauling needs. Let your GMC dealer show you how a heavy duty GMC can do a better heavy hauling job for you.

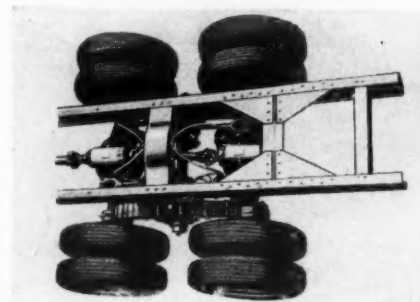
GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

THE TRUCK OF VALUE



GASOLINE • DIESEL

GMC's four heavy duty gasoline engines, of proved, efficient valve-in-head design, offer such performance and dependability extras as Turbo-Top Pistons, Air-plane-type Main Bearings, Tocco-hardened Crankshafts.



GMC's wide range of chassis options includes six basic rear axle designs. Illustrated is the rugged Worm Drive Tandem providing dual drive and maximum traction for extra heavy duty truck or tractor work.



Plant-Mix Paving Completes Airport

(Continued from preceding page)

foot booms respectively.

About 75 per cent of the excavated material was oversize, and would either have had to go through a crusher or be broken up as it was out on the field. What was missed by the dropped weights was crushed by two sets of dual-drum sheepsfoot rollers pulled in tandem by a D8 tractor. A Buffalo-Springfield 10-ton 3-wheel roller also helped crush and compact the sandstone. Two Galion motor graders assisted the dozers by spreading the material in 5-inch lifts.

The sandstone sub-base conformed to the following requirements of the specifications:

Maximum sieve size	2-inch
Plasticity index, not greater than	6
Liquidity limit, not greater than	25
Passing No. 40 sieve	10 to 80 per cent
Passing No. 100 sieve	3 to 25 per cent

Macadam Base Course

On top of the sub-base is a 9-inch dry-bound macadam base course laid in two 4½-inch layers. Most of this material was processed from the hard blue and gray sandstone rock. Crushing and stockpiling the stone was part of the first contract awarded by Kanawha County to the Harrison Construction Co. However, an additional 31,000 tons of stone was required, and this was supplied and delivered to the job by Anderson, Inc., of Charleston, W. Va. The material was crushed limestone from the Marble Cliff Quarries Co. at Columbus, Ohio, and was shipped to Charleston via the New York Central railroad. Altogether about 130,000 tons of stone was needed for the base course.

The base-course stone, from 3 down to ¾-inch, was loaded from the stockpiles into trucks by an Osgood 1½-yard shovel. It was spread in 10-foot-wide lanes by Jaeger spreader boxes pulled along by the trucks. The initial 4½-inch layer was shaped further to grade by the two Galions or by the Caterpillar No. 12 motor graders. The smooth-wheel roller next keyed the stones into place, after which the larger stones were choked with screenings put on by a Buckeye spreader. The screenings were a product of the earlier stone-crushing contract, and had been stockpiled at the airport along with the larger stone. They had been loaded by the shovel and then hauled out in trucks.

After the spreading, the screenings were brushed over the surface and worked down into the interstices of the stone by a Littleford power broom pulled by a Farmall rubber-tired tractor. Following this came the 3-wheel 10-ton roller again, to compact and set the stone in place. The second layer of the dry-bound macadam was put down right behind the first layer, using a second Jaeger spreader box.

Final shaping of the upper course was done by hand—that is, with rakes and stone forks—to within ½ inch of the theoretical grade. It was then choked, broomed, and rolled, as was the first course, and no variation over ¾ inch was permitted when the surface was checked with a 16-foot straight-edge. Excess material from the choke screenings was removed from the surface by the power broom.

The gradation of the base-course stone and the screenings fell within the following limits:

Sieve Size	Per Cent Passing
	Base-Course Stone Screenings
3-inch	100
2½-inch	90-100
1½-inch	25-60
¾-inch	0-10
¾-inch	100
No. 4	85-100
No. 100	5-25

Plant-Mix Paving

Two days before any paving was laid, the macadam base course was primed

with 0.3 gallon of MC-0 asphalt per square yard. It was shot in 10-foot lanes by a Littleford 1,300-gallon distributor mounted on a GMC truck, and it penetrated the base course from ¼ to ½ inch. All the bitumen for the job came from the Ashland Oil & Refining Co. at Catlettsburg, Ky.

The asphaltic concrete for the paving was supplied by the West Virginia Black Rock Co. of Charleston, W. Va., which is equipped with a Cummmer asphalt plant. Sand for the mix came from the Ohio River, and the crushed limestone was supplied by Marble Cliff Quarries Co. of Columbus, Ohio. Over a 12-hour day the plant produced an average of 650 tons of plant-mix, and once hit a high of 820 tons. Ten trucks, hired by the ton-mile basis, hauled the hot-mix 5 miles from the plant in Charleston out to the airport. Because of the steep hills leading to the airport, the round trip took about an hour. Tarpaulins over the trucks kept the contents hot so that the mix was placed at a temperature of 250 to 275 degrees F.

A single Barber-Greene Tamping-Leveling Finisher laid the one course of plant-mix, 2 or 2½ inches thick according to the location. It spread the material in 10-foot lanes from 500 to 800 feet long at a time. When it had completed that much, it moved back and did the same length on the adjoining lane. This sequence was followed as much as possible, so that only a couple of hours would elapse between lanes

and a tight smooth-riding joint would be insured. Rolling was done by both a 3-wheel 10-ton and a tandem 10-ton Galion roller, the first pass being made with the 3-wheel roller. The runways are shaped to a center crown of 1 per cent, and were paved with 15 lanes each 10 feet wide. Only 5 lanes were required for the taxiways.

The paving crew consisted of a
(Continued on next page)

UNINTERRUPTED WINTER TRAVEL

is Assured by

DAVENPORT - FRINK SNO-PLOWS



ALL TYPES AND SIZES

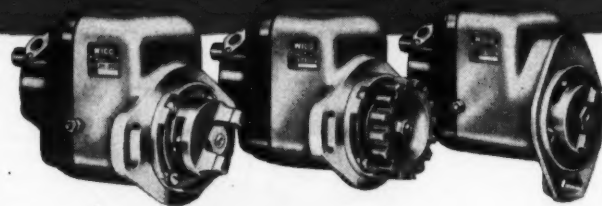
No matter what the snow or ice conditions, you obtain FASTER • SAFER • CLEANER snow removal with the lighter, yet stronger DAVENPORT-FRINK SNO-PLOWS. Available in "V" and Straight Blade types for all sizes of trucks, tractors, road patrols and locomotives. Be ready. Buy early. Write us for complete information.

DAVENPORT BESLER CORPORATION

Made in Eastern U.S.A. by CARL H. FRINK.

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DAVENPORT, IOWA
1000 Islands, CLAYTON, NEW YORK

Now... Dependable WICO Magnetos for replacement on CATERPILLAR Starting Engines



CATERPILLARS are used where equipment must take a beating. Such jobs just suit WICOs—built by the world's largest manufacturer of magnetos exclusively.

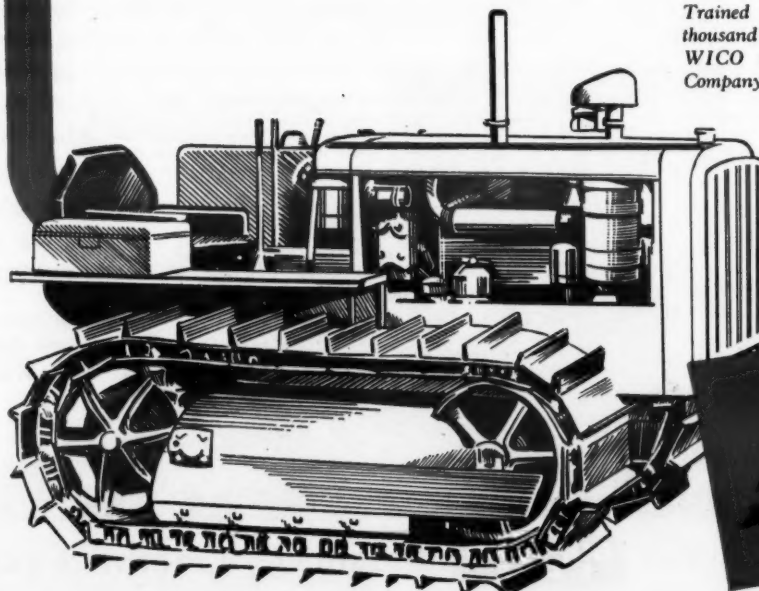
Leading tractor manufacturers supply WICOs as original equipment. These magnetos, engineered for hard, wearing working conditions, are on America's aristocrats in farm, contracting, road-building, mining and oil field equipment. Built with the precision

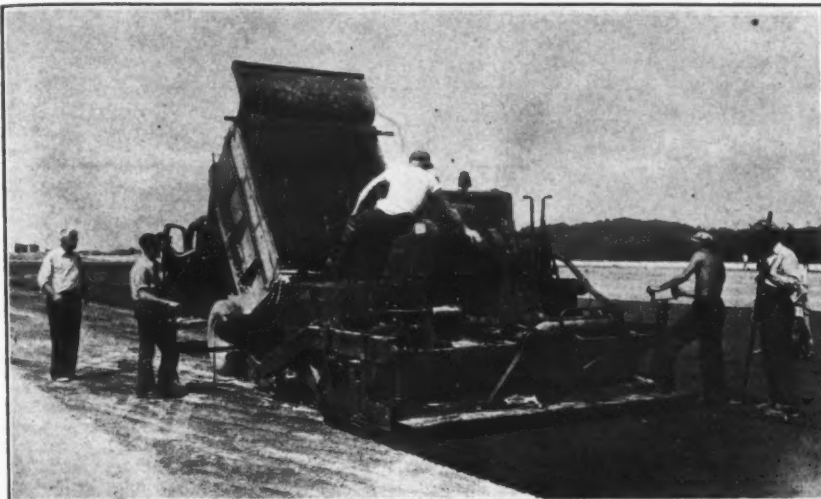
of a fine watch, WICOs take gruelling, 24-hour duty, where it's wet, oily and sandy, in their everyday stride.

These new aviation-quality magnetos are built specifically for Caterpillar starting engines.

Caterpillar Model	WICO Model	Price
D2, D4	XH1907	\$40 (gear incl.)
D6	XH1908	\$40
D7, D8	XH1906	\$36
D13000, D8800	XH1906	\$36

Trained field engineers and more than a thousand authorized service stations serve WICO users everywhere. Wico Electric Company, West Springfield, Massachusetts.





C. & E. M. Photos

A Barber-Greene Tamping-Leveling Finisher (left) lays plant-mix in a 10-foot lane on Taxiway A of Kanawha County Airport. Then two Gallion 10-ton rollers (right) take over—a tandem and a 3-wheeler. Allegheny Asphalt & Paving Co. was the contractor.

foreman; finishing-machine operator; screed adjuster to get the correct thickness; checker with straight-edge; two rakers, one on each side; four laborers for shoveling, sweeping, dumping trucks, and general clean-up; and two roller operators—or a total of 12 men.

Seal Coat

After the paving came a seal coat which consisted of an application of RC-2 asphalt at 150 degrees F, shot at the rate of 0.25 gallon to the square yard by the distributor. Again the 10-foot-lane width was employed. The bitumen was at once covered with a layer of limestone chips, from 1/4-inch down to fines, applied at the rate of 10 to 15 pounds per square yard from a Buckeye spreader box. The box was hooked to the tail-gates of the trucks which backed over the asphalt.

The chips were immediately rolled into the bitumen by a Bros Wobble Wheel rubber-tired roller—six wheels in front and seven in the rear—pulled along by a truck. This operation was repeated until the fine stone was well compacted. Excess chips were then brushed from the surface by the power broom pulled by the rubber-tired tractor.

The gradation of a typical batch of plant-mix, and the specification limits of the chips for the seal coat, were as follows:

Sieve Size	Per Cent Passing	Plant-Mix	Seal-Coat Chips
1-inch	100	.....	.....
3/4-inch	95	.....	.....
1/2-inch	85	.....	.....
3/8-inch	75	.....	.....
No. 4	.....	.....	100
No. 10	42	.....	70-100
No. 40	24	.....	0-70
No. 80	12	.....	0-5
No. 200	5.5	.....	.....

Asphalt, 120-150 penetration 6.0 per cent

A crew of 10 did the work on the seal coat. It included a foreman; 2 on the distributor; 2 riding with the spreader box; 2 in the trucks pushing the chips to the box; a truck driver pulling the roller; a tractor operator pulling a power broom; and a laborer. The latter spread a 3-foot roll of paper across each lane where the distributor was beginning to shoot the seal. This prevented too much bitumen in one place.

Drainage

All the drainage work was sublet by

the Allegheny Asphalt & Paving Co. to the Harrison Construction Co. Around

the edges of the runway, 6-inch perforated underdrain was installed a foot

below the bottom of the sub-base. Lo-
(Continued on next page)

MR. CONTRACTOR: When you arrange with your distributor to buy construction equipment, LET C.I.T. FINANCE THE TRANSACTION. It's good business to conserve your working capital for operating purposes. By keeping your funds liquid you can take advantage of every opportunity to effect savings when buying materials and supplies.

C.I.T. WILL FURNISH FUNDS, any amount at reasonable cost, for purchases of almost every type of construction equipment you use. You can combine the total cost of several pur-

chases in one easy-to-liquidate obligation. Let the equipment help pay for itself out of operating savings and increased efficiency.

Repayment can be arranged on terms to suit your needs. Select the equipment you need, tell us how you want to pay for it and the balance to be financed. Any office listed below will handle all financing details for you and, when you obtain delivery, a C.I.T. check will complete the transaction. Get in touch with us for terms and full information or send for NEW booklet on our financing service.

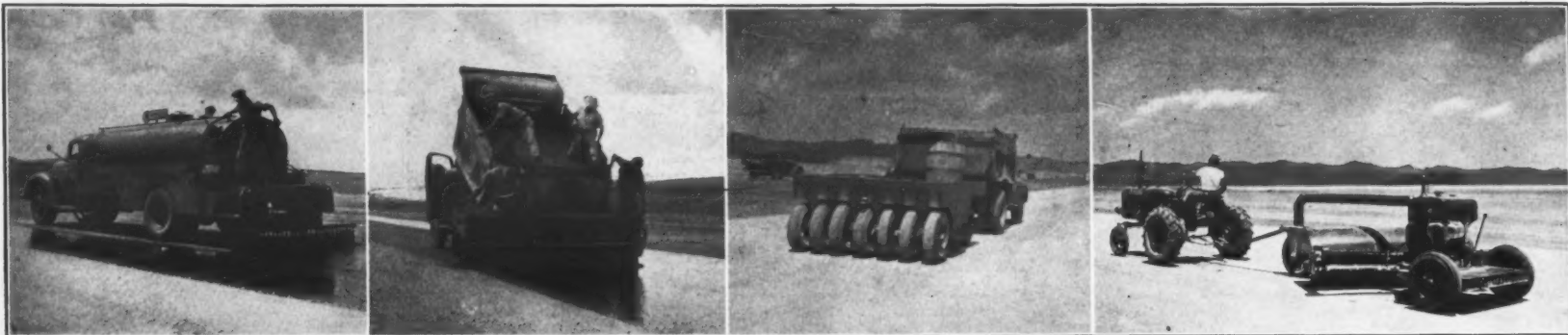
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C. & E. M. Photos

After Kanawha County Airport runways were paved with plant-mix asphaltic concrete, they were topped with a bituminous seal coat. Photos left to right: a Littleford distributor on a GMC truck shot RC-2 asphalt at 150 degrees F; a Buckeye spreader covered the seal coat with limestone chips; a Bros Wobble Wheel roller rolled the chips into the seal; and a Littleford power broom pulled by a Farmall tractor swept excess chips from the seal coat.

Plant-Mix Paving Completes Airport

(Continued from preceding page)

cated around the airport are 50 man-holes with open grates to take water from the runways. To prevent erosion down the slopes of the very high fills, a 2-foot-high berm with a 4-foot crown and $1\frac{1}{2}$ to 1 slopes has been built around the field. While this barrier prevents water from rushing off the field and gouging out the fill slopes in heavy rains, it would also hold the water on the field unless provisions were made to carry off the water.

To remove this surface storm water, 23 slotted catch basins were constructed around the edges of the field on the inside slope of the berm. They are spotted about 500 to 600 feet apart and collect the water from the surrounding area. A typical slot-type catch basin is 10 feet long, $2\frac{1}{2}$ feet wide, and $6\frac{1}{2}$ feet deep. The slotted opening has 13 inches of vertical clearance. When pipes flow into the basin from the field, the width may be increased to handle the additional water. The great depth of the basin permits the building up of a good head of water which will keep clear the outlet pipe going through the slope.

The walls are of brick, 8 to 12 inches thick, faced on the outside with concrete, and with a 28-inch-wide concrete apron running the length of the basin in front. The apron prevents erosion around the walls. At floor level an 18 to 30-inch bituminous-coated corrugated-metal pipe leaves the basin on a $1\frac{1}{2}$ to 1 slope and passes through and down the slope. At the bottom of the

into a velocity-retarding basin. This consists of a concrete open channel or sluiceway with a concrete dam or barrier in the center to slow up the fast-moving stream of water and to dissipate its energy. The water, with its velocity greatly reduced, passes around the dam or through a 6-inch opening in it, and thus reaches the toe of the slope without causing damage to the embankment.

Slope Dressing

As part of its earlier contract, the Harrison Construction Co. also had to dress the $1\frac{1}{2}$ to 1 slopes, which on runways 1 and 2 reached maximum heights of 217 and 170 feet respectively. Ordinary grading or slope-dressing equipment would have been out of place or distinctly dangerous on such high slopes, so the contractor worked out a novel method of his own for doing the job quickly and satisfactorily.

He placed a Lorain 40 Moto-Crane with a 45-foot boom on top of the slope in back of the 2-foot-high berm. To this boom he attached 500 feet of 9/16-inch steel cable. At the end of the cable he fastened a crawler tread taken off the side of a D8 tractor. The tread was 28 feet long and 22 inches wide. The inside of the tread was placed next to the slope so that the deeper indentations would give a better cutting action as it was pulled along the face of the fills.

In the beginning a steel track rail had been tried, but this failed to make much impression on the earth embankment since it was too smooth itself and would not cut the earth. With the crawler tread the slopes were smoothly dressed, and very little material was dislodged. The 1,000-foot-long fills were

done quickly, with the crane and drag making a 20-foot swath at each pass. The slopes were dressed from the top down, the crane moving back and forth along the top of slope, letting out additional cable at each pass. Because of the berm on top, a tractor could not be used instead of the crane; for the cable,

if it had been on a tractor, would only have cut into the berm. The crane boom kept the cable clear of the bank.

Seeding

In April, 1947, a crew from the Airport Section of Kanawha County Court (Concluded on next page)

HIGHWAY ENGINEERS SPECIFY and CONTRACTORS USE

The JACKSON VIBRATORY PAVING TUBE

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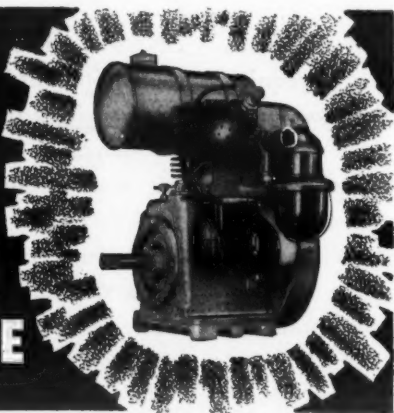
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These are heavy-duty, 4-cycle single cylinder engines that carry "Most Hp. Hours" service ratings. Equipped with tapered roller bearings at BOTH ends of the drop-forged, dynamically balanced crankshaft for long life and protection against bear-

ing failure; high tension outside magneto with impulse coupling for quick, easy starting in any weather; pump-circulated constant level splash lubrication system (no grease cups or oil fittings). Net weight: Model AB, 76 lbs.; Model AK, 77 lbs. Speed range: Model AB, 1600-2600 rpm; Model AK, 1600-2400 rpm.

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seeded 20 acres of the 1½ to 1 slopes with orchard grass. The seed was broadcast with a hand seeder, using no fertilizer, and was not raked in. The ratio of seed to land was 14 pounds to the acre. The orchard-grass seedlings did well in the mountainous country, and within a couple of months the grass had grown to a height of nearly 2 feet.

This past fall the Hinkle Contracting Co. of Paris, Ky., with a \$25,317.50 contract from the CAA, seeded and fertilized 20 additional acres on the slopes and 260 acres on the field itself.

Hangar

In the summer of 1947 the first hangar was erected at the Kanawha County Airport. The structure is 160 feet long x 120 feet wide with a roof height of 37 feet. A 25-foot-high door extends the width of the building, and on one side is a 20 x 160-foot lean-to. County forces constructed the concrete foundation, 3½ feet thick, with 8-foot curtain walls at the sides. The all-steel hangar was erected by the Irwin-Newman Co. of Houston, Texas.

The structure is built of galvanized steel, 18-gage for the sides and 24-gage for the roof which is supported on 17 bowstring trusses set on 10-foot centers. It is designed for 40-pound-to-the-square-foot dead load and 15-pound wind load; that means it would withstand a 70-mph wind.

All the material came from the Capitol Steel & Iron Co. of Oklahoma City, Okla., by rail to the Etowah, W. Va., siding of the New York Central Railroad; the eight carloads of steel weighed 250 tons. The material was unloaded and trucked a mile to the site where the members were fabricated and erected. Bolts connect the various parts, while the sidings are held in place with metal screws.

The unloading and erecting was done by a 50-foot derrick boom mounted on a truck and activated by a Tulsa winch. The job took two months and the structure cost \$58,560, not including the foundation. Hangar capacity is 35 light planes set flat, or 60 stacked up.

The airport was dedicated in November and airline operations were expected to start in December. Already five commercial airlines have been certified to use the field, and 40 flights are expected daily once the airport gets into full operation. The big lines will not use the airport for storage or for major repairs. Other small hangars will be constructed to house light planes as the need arises.

Quantities and Personnel

The major items included in the Allegheny Asphalt & Paving Co. contract were as follows:

Sandstone sub-base, 14 to 19-inch	83,500 cu. yds.
Macadam 9-inch base course	51,000 cu. yds.
Prime coat, MC-O asphalt	68,000 gals.
Asphaltic concrete, 2 and 2½-inch	21,150 tons
Seal coat, RC-2 asphalt	41,000 gals.
Seal coat, aggregate	1,400 tons
Fiber duct, 3-inch	12,000 lin. ft.
Perforated underdrain, 6-inch	20,400 lin. ft.
Excavation, drainage structures	14,000 cu. yds.
Concrete, drainage structures	760 cu. yds.

In addition to the 12 men employed on the paving and the 10 on the seal coat, 50 worked on the sub-base and base course, and another 60 on the drainage—or a total of 132 employees on the project.

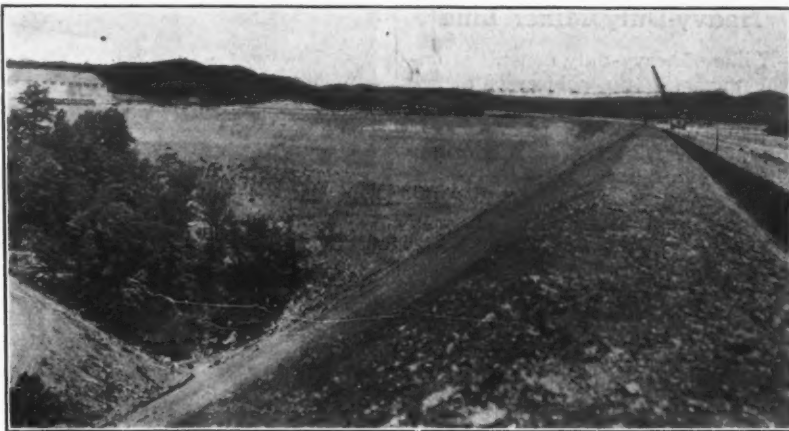
For the Allegheny Asphalt & Paving Co., Joe D. Tom was Superintendent,



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C. & E. M. Photo

On the Kanawha County Airport job a Lorain 40 Moto-Crane dressed the 1½ to 1 runway slope by pulling a length of tractor crawler tread across the embankment face.

while Kenneth Forsht was Superintendent for the Harrison Construction Co. Fred Alley is Director of the Airport Section for the Kanawha County Court. E. J. Ostrander was Resident

Engineer for the Civil Aeronautics Administration.

The project was under the general supervision of the First Region of the CAA, with headquarters in New York

City. R. M. Brown is Superintendent of the ANF Plant & Structures Branch. W. E. Cullinan, Jr., is Superintendent, Airports Branch.

Portable-Power-Saw Data

A catalog which tells about the operation of its wheel-mounted power-driven saws has been made available by the Harry A. Lowther Co., 141 W. Jackson Blvd., Chicago 4, Ill. Feature of the folder is a description of its C-Saw in use on the Lower Colorado River Authority right-of-way.

The folder describes the saw applications for clearing brush, felling trees, bucking logs, etc. It also describes the C-Saw clutch, the Rototrac propelling mechanism, the V-belt transmission, the extra-heavy 2½-inch tires, the aircraft type of wheel and axle design, and the screw adjustment for tightening the belt.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 64.

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3/8 to 40 Cu. Yds.



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- ★ Manganese Steel Chains, fittings, and reversible tooth points.
- ★ Full Payload every trip, even in wet digging.
- ★ Perfect Balance; handles easier, fills faster, dumps cleaner.
- ★ Three Types: light, medium, and heavy duty, with or without perforations.

Yes, you too can get bigger payload PROFITS with low-cost operation by hooking up a Hendrix Lightweight Dragline Bucket, because a Hendrix automatically steps up your YARDAGE. Since they are 20% to 40% lighter than other buckets, type for type, they can be used on a machine designed for small operations and still maintain the allowable loaded weight.

Where else can you find a bucket which is lightweight, yet as durable as a Hendrix? Designed by men with "know-how" in the dirt-moving field, and built by men of experience, the Hendrix Lightweight is your best bet FOR BIGGER PAYLOAD PROFITS WITH LOW-COST OPERATION.

Write us or ask your dealer, for descriptive literature.

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The Weston combination dump and spreader body is made in 9, 11, and 13-foot lengths. Dump gates open to 5½ inches for rock or gravel, and the unit will spread a path of lime or chlorides 30 feet wide or more, depending on speed.

Dump, Spreader Body

A combination dump and spreader body, made in sizes to fit most standard truck chassis, is available from the Weston Dump Body Co., 326 So. W. 11th St., Des Moines, Iowa. It is made in 9, 11, and 13-foot lengths. The center-dump gates are said to open to 5½ inches to permit the passage of rock or gravel. When the unit is spreading lime or chlorides it will lay a path of material 30 feet wide or more, depending upon truck speed, according to the manufacturer.

The distributor fan is 21 inches in diameter, and is fitted with a slip clutch designed to provide for slipping if an obstruction stops the turning of the fan. The 1½-inch cross shaft in the conveyor mechanism is covered with a shield. The Weston unit is equipped with Spicer universal joints in the main drive, and has a heavy cone-drive gear reduction for the 20-inch-wide drag chain. Different gear ratios are available to provide the proper fan speed on different trucks. Power take-off for the drag chain and spreader fan is controlled from inside the cab.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 13.

New-Style Electrode

A new mineral-type extrusion-coated electrode designed to eliminate under-bead cracking is available from the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. Said to be hydrogen-free, these electrodes are made in diameters ranging from ¼ to ½ inch, and are recommended by the company for use with ac or reverse-polarity dc. They require lower arc voltages than the E-6010 or E-6020 electrodes, and use slightly higher current values.

Some of the uses suggested for the new Flex Arc electrodes are welding high-carbon steels; welding high-carbon to low-alloy steels; welding low-alloy steels; welding high-sulphur-bearing steels; welding mild-steel structures that are to be vitreous-enameled without previous heat treating; and for welding steel parts of unknown analysis.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 7.

Waterproofing Compound

A broadside describing changes in its waterproofing compound has been issued by the Ranetite Mfg. Co., Division of the Ranetite Waterproofing Corp., 1917 So. Broadway, St. Louis 4, Mo. This compound, known as Ranetite No. V, is a transparent formula for waterproofing walls of brick, stone, stucco, and similar surfaces. By adding a solution of carbon tetrachloride, this material has been made fire-resistant, the broadside states. And aluminum and calcium stearate have been combined as a base for greater sealing efficiency.

The broadside tells how to apply this material and what it will do; it also reprints the manufacturer's guarantee of the compound.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 69.

Heavy-Duty Mixer Line

A line of heavy-duty non-tilt drum-type mixers is the subject of a new catalog released by the Gilson Bros. Co., Fredonia, Wis. It tells the complete story of the Gilson Morspeed mixers. These are furnished on 2 or 4-wheel mounts, either side or end discharge. There are two primary lines: one with a hydraulic power loader and skip shaker; and the other with a cable hoist and mechanical skip shaker.

The catalog tells what each model is built to do. There are several on-the-job photographs, and a drawing which shows the action and flow of materials in the mixing drum. One page of the folder is devoted to specifications of the hydraulic-power model. The last page shows the small Gilson models which range from 2½ to 3½-cubic-foot capacities. The large models are built in 6 and 11-cubic-foot capacities.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 82.

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Performance everywhere has proved Schramm Air Compressors can do any compressed air job you require. Write today for list of models and sizes.

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Crusher Speeds Road To Hungry Horse Dam

Portable Crushing Plant Produces Topping Gravel At High Speed for Road To Huge \$97,000,000 Dam

THE main contracts for Hungry Horse Dam, the world's third largest, a \$97,000,000 concrete barrier, will indeed be something to watch, if they are pushed through with the same efficiency as Kiely Construction Co.'s subcontract on the access road. That is the consensus of contractors and engineers who saw Bill Kiely's portable rock plant rip through 21,000 tons of crushed road material in 25 days.

As if to give some indication of his speed and efficiency, Kiely moved his entire plant 130 miles to Hungry Horse Dam from Libby, Mont., in three days—from Monday, August 4, to Thursday, August 7. Installation of a brand new set of scales held up the job for 48 hours, but the plant was producing 2½-inch-minus crushed sub-base material on Saturday. And by Monday it had stepped up to near-capacity production of 130 tons an hour.

Kiely's job consisted of producing the sub-base material, bituminous-topping aggregates, and cover chips for the 8-mile access highway which was built from U. S. 2 south along the high, timbered gorge of the South Fork of Flathead River to the dam. The prime contract for this road was held by S. Birch & Son, the F. & S. Trucking Co., and McLaughlin, Inc.

Set-Up Contains New Equipment

Sparked by young, alert Bill Kiely, a relative newcomer to the heavy-construction game, the crushing plant set-up was brand new throughout. In the order of production, it consisted of a new Caterpillar D8 with Caterpillar blade and power-control unit, a special feeder built by Kiely, a new Cedar-apids Junior Tandem crushing-screening plant, Fairbanks-Morse scales, a shop and parts trailer, and a Hobart electric welding machine. Each of these machines had its place. Not one piece of junk could be found anywhere near the set-up.

The special feeder was a radical departure from the conventional, and it caught the eye of some county and state highway engineers who saw it in use. Built at Kiely's headquarters shop in Butte, Mont., it consisted of a steel trap, braced internally by 8-inch steel I-beams, with the steel plate tapering towards the back on every side. This made it possible to hook the tongue to the tractor, yank it forward an inch, and free it from the weight of tons of gravel all around its sides.

The feeder was mounted on wheels to make it fully portable. When it was set up, holes were dug under the wheels to take the weight off the tires while the plant worked. Tough steel struts and the axle bore the weight above. Fir boards 3 x 10, rough on four sides, covered the top of the trap in front of the feeder opening.

A plate feeder, also made by Kiely's men, was installed in this feeder hopper. It was driven by a chain belt hooked to the bottom end of the main conveyor, which took the pit-run material from the trap up to the Cedar-apids crusher.

Meet the Crew

The human cogs of this fast machine were as important as any of the mechanically excellent equipment. Because their enthusiasm gave so much to this small subcontract, you should know them personally.

Meet Earl Wilcox, the Plant Superintendent. Grizzled, tough as leather and twice as hard, Wilcox was the man who fought the primitive telephone at Hungry Horse to keep enough trucks



C. & E. M. Photo

Here, hard at work, is the crew whose enthusiasm gave so much speed to Kiely's rock-crushing subcontract. In the foreground is the man who sparked this enthusiasm, Contractor Bill Kiely (right), chatting with Plant Superintendent Earl Wilcox. Just behind them, crushed rock drops directly to a truck standing on the scale platform.

rented so the plant could run full time.

Meet, too, Crusher Foreman Len MacMillan, who took over the crew for five weeks while Wilcox was running a concrete-paving job at Butte, Mont.

When Wilcox returned, MacMillan went to Wolf Point, Mont., to finish an oiling job there for Kiely.

There was also Matt Basaraba, wiry, (Continued on next page)

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Crusher Speeds Road To Hungry Horse Dam

(Continued from preceding page)

dark, hard-working catskinner. Formerly with Inland Construction Co. at Miles City, Matt stayed with Bill Kiely throughout the summer because a darn good chance for plenty of overtime and the likable personality of the contractor appealed to him.

Matt's job consisted of pushing the pit-run material about 400 feet into the special feeder. Matt's technique consisted of pushing a not-overloaded bulldozer blade full of material up close, and then crowding it in a little at a time. You should also know that Matt was not a lazy man. When his D8 hit a nest of the big red argillite boulders 8 to 30 inches in diameter, Matt was not too good to jump down off his machine without being told, and help throw them aside so the 10 x 36 jaw crusher would not have to be burdened.

It is good to know a man like Matt. Better yet, it is good to have a man like Matt Basaraba on the payroll. Perhaps that explains the three telegrams he received . . . and ignored.

Next in line comes Norman Erickson, a sun-tanned Scandinavian youngster, who was doing an excellent job of tending the trap the day we saw him at work, despite his worry over his sister, seriously ill, in Moorhead, Minn. Doggedly he bent his back to the task of removing most of the oversized boulders as they tumbled down in front of the trap. When it got a little tough, Matt Basaraba was down there helping him. When Norman raised his arm to signal for more material, Matt was somehow back in the seat of the D8.

Norman developed so much dexterity in his job that he could pick up a sliding boulder coming down into the feeder and use its motion to advantage in flipping it aside.

And on the conveyor belt, about half-way up on a wood platform, stood the youngest member of the crew, Earl Wilcox, Jr. Not only the youngest but the most envied. For Earl was admittedly the Romeo of the crew, at the tender age of 17, too! Earl's job was to pick off any big boulders Norman Erickson missed. In between rocks, Earl stood and daydreamed of the fun he'd have back in his junior year of high school in Butte, Mont. That's where he is as you read this. The extra money he earned flipping boulders off the conveyor will buy many a soda for a certain slick chick.

Up on the platform of the Cedar-



C. & E. M. Photos

In the first photo we see Matt Basaraba pushing pit-run material to Kiely's shop-built feeder. We also get a look at the Cedarapids Junior Tandem crushing-screening plant which ripped through 21,000 tons of crushed road material in 25 days. Now let's walk around in front of Matt and get a glimpse (second photo) of the cooperative catskinner and his D8 with bulldozer.



apids Junior Tandem crushing plant, tending the control levers with a practiced hand, stood E. H. Lemen, operator. With amazing ability, Lemen could pick a discordant note from the deafening cacophony of the running plant. Juggling a lever here, another there, he controlled feed and output so expertly that the plant ran steadily at its capacity or a little over.

Ever so often he glanced down at the ground to check on Earl Worley, wizened little plant oiler. Hustling back and forth with his grease gun and oil can, Worley also sported a honey of a black eye. Some of those boom-town joints at Martin City are tough.

Down in the scale house, looking austere and serious, sat F. W. Warnock, Inspector for the U. S. Bureau of Reclamation. No worrying, daydreaming, or memories of fights for him. Instead, all emotion was carefully subordinated to the task of weighing exactly 12,000 pounds out to each load, of writing out the truck driver's ticket, and of choking off the conveyor feed at the right instant. He was mighty accurate at it, too.

Not in sight in the daytime, but always there in the dead of night, was Bob Syth, the night welder and one of the most important men on the job. When darkness was heavy in the lonely solitude, and the gurgle of green water in the Flathead was the only natural noise, the splutter of his arc-weld and the humming of his Hobart welder could also be heard. Each night, without fail, he worked with Stoddy self-hardening rod to build up the roll crushers; to keep them from wearing excessively in the center; to keep their surfaces rough so the rock would grab and feed through at high capacity.

Lonely and unsung, seen only on Saturday, payday, his was a great part of

the teamwork that saw the Cedarapids machine leave the Hungry Horse project as good as the day it was new.

Then there were Allen Toal and Archie Redden, two top-notch pace-setting truck drivers, always on their toes about keeping their trucks in top condition at all times. Last—but we think not least, because the teamwork of these men came in response to his own personality—meet Bill Kiely, sub-contractor. The kind of man you already expect him to be, Kiely disclaims any credit. "Really, I don't know too much about this rock business, but don't you think that crew of mine is one of the finest you've seen?" he said, smiling.

Kiely Bares His Secrets

The greatest secret of the speed with which the Hungry Horse road material was run was, of course, the crew, the equipment, and its portability. It must also be mentioned that Kiely tol-

erated no mechanical or human dead-wood. The plant had no storage bin. Instead, a truck sitting on the platform of the Fairbanks-Morse 20-ton beam scale took its load direct. As the length of haul varied, Kiely hired more trucks at \$3.60 an hour to augment his five new Fords which he always kept in attendance. By having the trucks take their load without lost motion, while standing on the scale, Kiely made it possible for the U. S. Bureau of Reclamation to put exactly 6 tons net on each truck and to get complete accuracy in placing the material on the highway.

Kiely's plant was so perfectly portable that just before he did the Hungry Horse work he moved the whole set-up ½ mile on some highway work, and was set up and crushing again just 3½ hours from the time he shut down!

"That scale we now have has complicated the situation a little," he said, (Continued on next page)



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1	2 1/8"	\$1.90
2	2 3/8"	1.90
3	2 3/4"	1.90
5	1 1/2"	1.90
55	2"	1.90
6	1 1/2"	1.90
66	1 3/8"	1.90
7	2 1/2"	1.90
8	3"	2.50
9	3 1/8"	2.50
10	3 1/4"	2.50
11	3 1/2"	2.75
12	4"	3.00

Write Dept. C-1



WATERLOO FOUNDRY CO., WATERLOO, IOWA

"but we'll put it on rubber after this job and have it portable, too."

Kiely kept a full set of screens in all sizes available all through the job, to meet the specifications. To produce the 2½-inch-minus sub-base rock, he used a 3 x 10-foot 3½-inch-mesh screen on the top deck and a 2½-inch screen the same size on the lower deck. All oversize rock on the top screen went through the 10 x 36-inch Cedarapids jaw crusher; all oversize on the bottom deck passed through the rolls.

His cheery "Good morning" to his men was another secret. So was the friendly admonition, "Watch your foot doesn't get down in that plate feeder, Erickson", or "Maybe you can ride that conveyor, Earl, but I wouldn't dare do it!" Friendly and casual, his little hints carried with them a sincerity much more effective than the now-popular theme, "You're just part of my insurance cost, Joe. To hell with you, just don't run up my expenses!"

Three Sizes Produced

Some 16,100 tons of sub-base material, placed on the access highway from 4 to 8 inches thick, were produced to meet the following specifications:

Screen Size	Per Cent Passing
2½-inch	100
No. 4	25-50
No. 200	0-12

About 4,300 tons of crushed mineral filler for the bituminous surfacing course were also crushed to meet the following size requirements:

Screen Size	Per Cent Passing
¾-inch	100
No. 4	40-65
No. 10	30-55
No. 40	15-35
No. 200	5-15

Stone chips for the sealing course totaled only 500 tons, and were graded thus:

Screen Size	Per Cent Retained	Per Cent Passing
½-inch	.....	100
No. 4	.....	15
No. 10	95	.....

As an additional requirement on stone chips, 75 per cent of the material retained on the No. 4 screen had to have a fractured face, which gives some idea of the amount of crushing necessary.

The crushed material was hauled by Kiely from the crusher to the access road and spread according to directions of the Bureau of Reclamation inspectors assigned to this work.

On the basis of its performance through 1947, and according to Kiely's records, the Cedarapids plant with the



C. & E. M. Photos

Meet Plant Superintendent Earl Wilcox (left in the first picture), tough as leather and twice as hard, and alert young Contractor Bill Kiely at his side. Meet Earl Wilcox, Jr., in the other picture, Romeo of the gang but nonetheless adept at picking big rock off the conveyor belt to give the crusher a "break".



crew and methods just described produces 55 cubic yards of ½-inch-minus material per operating hour.

Access Road Is Finished

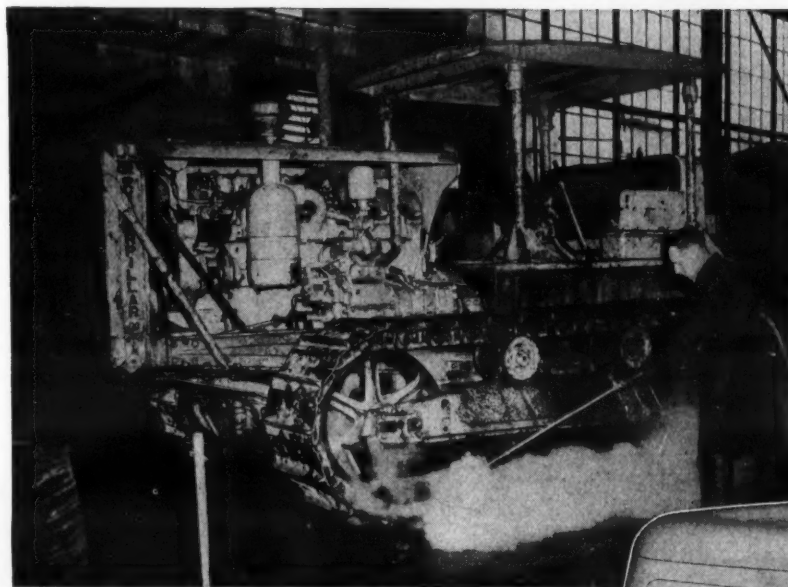
When the Hungry Horse project was visited in mid-August of 1947, the ac-

cess road was virtually completed and preparations were under way to start
(Concluded on next page)

CLEAN

- Dirt and Grease From Heavy Machinery
- Motors Before Overhauling
- Equipment For Repairing
- Tools . . . Walls . . . Floors . . . Runways

8 to 10 Times Faster



Compact . . . portable . . . easy to operate . . . Hypressure Jenny can be used on the job or in the shop. In less than a minute from a cold start, Hypressure Jenny's blast of steam, hot water and cleaning compound, loosens and flushes away almost instantly, mud, muck, dirt, and grease from construction equipment.

When used to clean machinery before repairs, Hypressure Jenny saves up to 40% of your mechanics' time which otherwise would be lost wiping oil and grease from tools and equipment. Besides increasing the efficiency of both men and machines, Hypressure Jenny steam cleaning exposes lubrication fittings and grease cups, and removes sand and grit which otherwise might enter bearings . . . reveals damaged or worn parts permitting repairs before service failures occur . . . eliminates fire hazards due to the handling of volatile cleaning fluids.

Hypressure Jenny is fast . . . 8 to 10 times faster than hand cleaning . . . thorough . . . economical . . . and so safe and easy to use that ordinary labor can operate it.

Complete details and the address of your nearest Hypressure Jenny dealer are yours for the asking. Write today.

HYPRESSURE JENNY DIVISION
HOMESTEAD VALVE MANUFACTURING CO.
P. O. BOX 30 CORAOPOLIS, PA.

DURBIN-DURCO, Inc.

Manufacturers Certified Specialty Products
Malleable Iron • Drop-Forged • Steel

LOAD BINDER — MALLEABLE IRON
Heat Treated • 5 Sizes

With New, Improved, Reinforced
Non-Spreading Mouth



Pat. Pending

	1 Swivel	Wt. Each
MIDGET No. 1—1/8" chain	2½ lbs.
DELTA No. 1—1/8" or 3/8" chain	6½ lbs.
	Two Swivels	Wt. Each
DIXIE No. 1—1/8" or 3/8" chain	10 lbs.
LONE STAR 1—1/8" or 3/8" chain	14 lbs.
LONE STAR 2—1/8" or 3/8" chain	17 lbs.

LOAD BINDER — DROP-FORGED
Heat Treated • 2 Sizes



Two Swivels

Durbin-Boomer F-1—for 1/8" chain	.....	10 lbs.
Durbin-Boomer F-2—1/8" or 3/8" chain	.....	12 lbs.

Other Durbin-Durco Products

COMBINATION ROPE HOIST AND
WIRE STRETCHER • Extra Heavy Duty

ALL-STEEL ROLLER BEARING, ROPE HOIST

WOVEN WIRE FENCE STRETCHER
Lever Action, Double Ratchet, Also Worm Gear Type

WRITE FOR CATALOG • Dept. CEM

DURBIN-DURCO, Inc.

6611 Olive St. Road • St. Louis 5, Mo.



C. & E. M. Photos

"No lost motion" was one of Kiely's secrets on his access-road subcontract. A Ford truck, in the left photo, takes its load of crushed rock direct, standing on a Fairbanks-Morse beam scale. At right, it delivers the material to the Hungry Horse Dam access road along the timbered gorge of the South Fork of Flathead River.



Crusher Speeds Road To Hungry Horse Dam

(Continued from preceding page)

the call for bids on the dam proper.

First contracts for clearing the huge reservoir were starting. By midsummer of 1948 work will really be under way in earnest. Last season's work saw the access road finished, a government camp built near Martin City, and warehouse facilities constructed.

Dam to Be Gigantic

Kiely's rock subcontract, an excellent example of good contracting, will be an infinitesimal thing compared to the scope of work on Hungry Horse Dam and power plant. Kiely's entire amount of 21,000 tons of crushed material will more than likely be handled in one day when large-scale concrete work gets under way.

For Hungry Horse Dam, to cost \$97,000,000, is now slated to be the world's third largest dam. Rising about 560 feet from bedrock in the high-walled gorge of the deep river canyon near Coram, Mont., the gigantic barrier will be a key structure in the Columbia River development and irrigation program. Its reservoir will help to control the lower stream. When the water escapes through controlled penstocks, it will generate additional power for the northwest.

A dream of men that began with Lewis and Clark, and reached the ex-

ploratory stage as early as 1923, is thus soon to become a reality. The names of Davis, Bashore, Savage, Young, and others figure largely in its conception.

Personnel

Michael W. Straus is the Commissioner of Reclamation at Washington, D. C., in overall charge of the undertaking; Walker R. Young is Chief Engineer of the Bureau in Denver; R. J. Newell is Regional Director at Boise, Idaho; and Clyde C. Spencer is the Project Engineer at Columbia Falls, Montana.

Hydraulic Power Unit

A hydraulic power unit which combines a pump, relief valve, operating valve, oil tank, and oil filter in one package is produced by the Machinery Equipment Division of Vickers Inc., 1492 Oakman Blvd., Detroit 32, Mich. Power can be applied by direct drive or through V-belt, chain drive, or gears.

According to the manufacturer, the Vickers Power Pack will deliver 2, 3, or 5 gpm at 1,200 rpm and 1,000 psi. This hydraulic pressure can be used to lift, lower, push, pull, load, hold, etc. The power delivered is determined by the size of the cylinder. With a 2-inch-diameter cylinder, using 4-hp input at 1,200 rpm and 1,000 psi, the unit is said to be capable of lifting 3,140 pounds. Under the same conditions but with a 4-inch cylinder, this lifting power is increased to 12,560 pounds. Using two

cylinders will double these capacities. Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 23.

"SOME BIG CONSTRUCTION JOB GOING ON DOWN THERE"

"YEAH! GOOD JOB, TOO! THEY'RE USING"

HELTZEL STEEL FORMS

Airport, highway, sidewalk, curb and gutter, or whatever job it might be, there are sure to be Heltzel Steel Forms in the picture. You depend on Heltzel because their concentrated engineering has worked every detail to practical purpose. Each exclusive feature added has eliminated another problem for you.

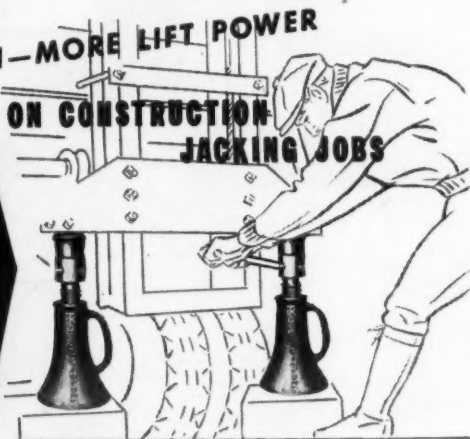
Special Heltzel dual duty forms at Patterson Field carried the heaviest construction equipment ever supported by any forms. The same set of forms were used for both 21" and 25" slabs.

Heltzel Standard 1/4" Form

The same practical engineering that designed the special dual duty forms for the Patterson Field job is found in every Heltzel Steel Form. The standard form (illustrated above) is built to last, handle easily, and produce a better job. Moved from job to job, year in and year out, they set quickly, interlock smoothly, and strip away easily. They stay rigid because THE SINGLE WEDGE POCKET HOLDS STAKES FIRM—they can't vibrate loose.

FOR LESS FRICTION—MORE LIFT POWER

USE
SIMPLEX
Screw Jacks



Simplex Screw Jacks cut friction 88% with a single, chrome-molybdenum steel pivotal ball nested under cap to center load—won't flatten. Drop forged steel cap is non-slip, with self-leveling 9 degree float—positively will not twist out from under load.

Housings of tough malleable iron have broad base for stability. Safety peephole in base. Color indicates jack capacity. High carbon steel bars are 40% stronger than ordinary bars.

THE SAFER, STURDIER JACKS FOR CONTRACTORS, BUILDERS AND OPERATORS OF ALL TYPES OF HEAVY EQUIPMENT

RATCHET OR 4-WAY
HEAD TYPES
31 MODELS
CAPACITIES
10 TO 24 TONS

ASK FOR BULLETIN
INDUSTRIAL 48

Simplex
LEVER - SCREW - HYDRAULIC
Jacks

TEMPLETON, KENLY & COMPANY
1006 South Central Ave., Chicago 44, Illinois



Heltzel Steel Form & Iron Company, Warren, Ohio

Send me the following:

☐ B-19 Steel Highway and Airport Forms

☐ B-19A Steel Dual Duty Airport Forms

☐ A-20 Steel Forms for Curbs or Curb and Gutters or Sidewalks.

Name _____

Address _____

City _____

State _____

(Type of construction usually engaged in)

HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO - U. S. A.

Heltzel
BUILDS IT BETTER

BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary

CENTRAL MIXING PLANTS
BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)

ROAD FORMS (with lip curb and integral curb attachments)

CURB FORMS

CURB AND GUTTER FORMS

SIDEWALK FORMS

CONCRETE BUCKETS

TOOL BOXES

FINISHING TOOLS FOR CONCRETE ROADS



The new Type 5 Model 50 Osgood 3/8-yard excavator is available as shovel, dragline, clamshell, crane, and backhoe. It employs a rope-crowding mechanism patented by the Osgood Company.

New Model Excavator In the 3/8-Yard Class

A new model excavator in the 3/8-cubic-yard class has been announced by The Osgood Co., Marion, Ohio. The new Type 5 Model 50 is designed as a speedy, maneuverable, lightweight unit for use on excavating and materials-handling jobs. It is available as a shovel, dragline, clamshell, crane, and backhoe.

All main operating machinery is positioned on a welded deck, said to be proportioned to take any stresses set up during operations. Power may be furnished by either a gasoline or diesel engine. Swing, travel, and hoisting motions are activated by Twin Disc clutches. All controls are grouped in front of the operator. The cab is designed to give protection from the weather, and yet to afford the operator full view of his work.

The Type 5 excavator employs a rope-crowding mechanism patented by Osgood. In this mechanism, the ropes are arranged to give a direct, positive, and independent crowding action. The manufacturer explains that this allows shallow cuts and holding to grade.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 9.

Gas-Welding Tools

A line of gas-welding equipment is made by The Harris Calorific Co., Cass Ave., Cleveland, Ohio. The Harris line includes all types of torches, cutting and welding tips, regulators, gas filters, back-pressure valves, generator trucks, goggles, and other related equipment. Products in the line are made up in complete assemblies, or can be supplied in individual units.

The line covers a large number of sizes and styles said to fit all requirements. The equipment is designed to be used with natural gas, coke-oven gas, liquid fuel gases, and others, as well as with acetylene. The torches are adaptable to a wide range of purposes and needs.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 50.

Sheepsfoot-Roller Data

A folder describing its line of tamping rollers has been prepared by the W. E. Grace Mfg. Co., 6000 So. Lamar St., Dallas 1, Texas. The folder covers both the single and double-drum types. A complete list of specifications is given for the Model XX 95 21,000-pound unit; the SX 64 8,600-pound unit; the SX 112 9,400-pound unit; the TX 96 7,900-pound unit; and the X 112 4,500-pound unit. The specifications cover the sizes and dimensions of the drums, the number of feet per drum, the area of the foot ends, pressure per foot, and other relevant data.

One section of the folder is devoted to a description of the Timken-bearing axle, its construction and its features. There are photographs of many of the roller models, and one showing the units at work in the field.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 61.

Dump Bodies and Hoists

Literature describing its line of hydraulic hoists and dump bodies can be obtained upon request to The Marion Metal Products Co., Marion, Ohio. According to the company, there is a Marion body and hoist to fit every need, and the folders that are available list many of these styles.

One folder tells of the Models No. 626 and 726 medium-duty hoists and bodies which are built for use with long-wheelbase trucks. Another describes the Models No. 736, 840, and 7740 Hi-Lift hoists and bodies. A third piece of literature distributed by the company covers the Models HD-7 and HD-8 heavy-duty hydraulic hoists and bodies. A fourth piece of literature describes the Model HD-10, especially recommended by the manufacturer for use on heavy-duty trucks and tandems or trailer dumps.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 68.

TUTHILL

GUARD RAILS

SAFETY APPEARANCE VISIBILITY

TUTHILL GUARD, with its convex surface and spring brackets, is safer, for two reasons. It can be seen quicker at longer distances. Its deflective action deflects cars back into highway and absorbs impact. Result—more lives saved—less damage to car and guard rail. Low upkeep cost.

Request Details

TUTHILL SPRING CO.

762 W. POLK STREET, CHICAGO 7, ILLINOIS



Have you seen the MultiFoote DuoMix 34-E Paver? If you are planning on new paving equipment be sure you see it and get all the details on this unusual double drum equipment.

It's built to keep a-running! It's powerful! It's simple in design! It's fast!

Lift the doors under the deck. You will be amazed at the small amount of machinery. It means easy upkeep—low-cost maintenance. Unusual crawler design with a self-cleaning type of action gives the MultiFoote low ground bearing pressure and makes it light on its feet.

The rotary transfer and discharge; the big, fast-acting skip; the high-speed bucket with its simple outside door action; mean seconds saved in getting the batch to the grade.

Add to this the power-operated superstructure for low clearance, the high operating platform for clear visibility, the no-pressure water system and other MultiFoote advantages, and you can see why it's the smoothest, fastest Double Drum Paver on the road today. Ask for the latest catalog.

General operating mechanism of the DuoMix. Note the simplicity! Few shafts, few gears mean accessibility, easy adjustment, easy maintenance. The MultiFoote is built to keep a-running.



THE FOOTE CO., INC.

1916 STATE STREET
NUNDA, N. Y.

Also see page 89

MULTIFOOTE

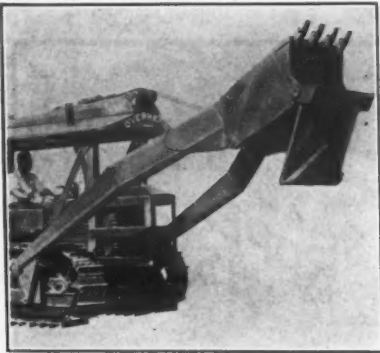
DuoMix 34E

(DUAL DRUM)

CONCRETE PAVERS

Builders of

Adnun BlackTop Pavers,
MultiFoote Concrete Pavers,
and Foote Kinetic Mixers



The Sargent Overhead loader, with anglegrader, backhoe, and snow-bucket attachments, is now available for International T-9 and TD-9 crawler tractors, as well as for Oliver Cletrac tractors.

New Tractor Loader

A new model Sargent Overhead loader has been added to its line by Maine Steel, Inc., South Windham, Maine. It is designed for use with the International Harvester T-9 and TD-9 tractors. The Overhead consists of a tractor hook-up plus a boom on which various attachments can be placed. The manufacturer says that this unit will not interfere with normal tractor operations, and that it does not have to be removed each time the tractor is used.

Attachments are available which will convert the Overhead into an anglegrader, backhoe, or a snow loader. Other attachments which will be made available include a bulldozer blade, pipe layer, snow plow, grubber, and log loader.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 30.

New Ball-Bearing Catalog

A new catalog on its MM line of ball bearings is being distributed by The Fafnir Bearing Co., New Britain, Conn. Said to be made to ABEC-7 tolerances (as established by the Annular Bearing Engineers Committee) they are recommended by the manufacturer for use in spindles, work heads, boring heads, live centers, and similar applications where high speed or accurate processing is required.

The catalog carries general information on mounting, pre-loading, lubrication, etc. It lists dimensions and load ratings of the various sizes of units made in the extra-light, light, medium,

duplex, and extra-small series.

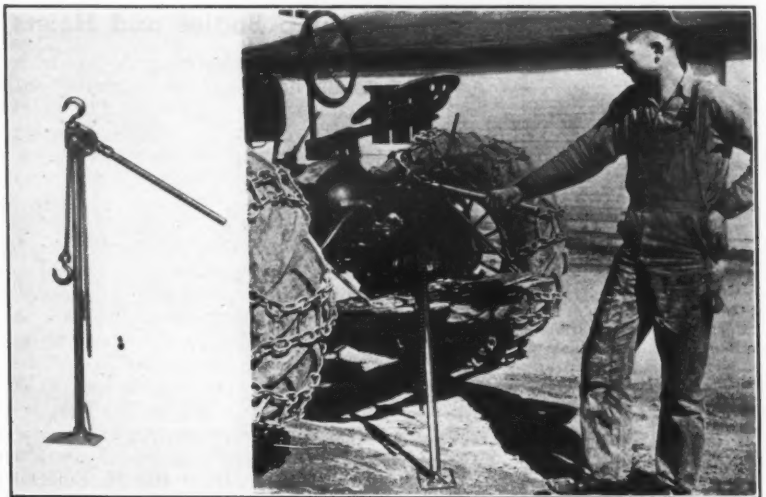
Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 51.

Hoist-and-Jack Unit

A combination hoist and jack designed to move or lift heavy loads on construction jobs or in shops has been introduced by The Coffing Hoist Co., Danville, Ill. Consisting of three pieces—stand, hoist, and handle—it has a rated capacity of 2,000 pounds.

The Hoist-Jack features a simplified ratchet-and-pawl construction; a safety-load handle designed to bend at maximum overload; and a stroke which, at the top, brings the handle to a level with the top of the hoist frame horizontally.

When disassembled, the unit can be carried in a toolbox. Some of the uses for which its manufacturer recommends it include changing tires, lifting material, hoisting machinery onto skids for moving, retracking tunnel cars, etc.



The new Coffing Hoist-Jack can lift tractors or other equipment when it's necessary to put on chains or change a tire. It has a rated capacity of 2,000 pounds.

Weight of the hoist alone is 13 pounds; complete, 23 pounds. The height of the stand is 42 inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 15.

Turnpike in Massachusetts GETS FACE-LIFTING



Wetting down subgrade prior to initial pour of concrete in fourth lane.

Officials on the job. Left to right: Charles B. Teague and Robert S. MacEachern, both of Massachusetts Department of Public Works, with (at right) A. Soma, Superintendent for B. Perini & Sons, Inc.



Because it is no longer a match for the heavy traffic encountered in northeastern Massachusetts, the 30-mile-long Newburyport Turnpike, famous route from Boston to Maine and Canada, is gradually being relocated and widened into a four-lane, divided highway.

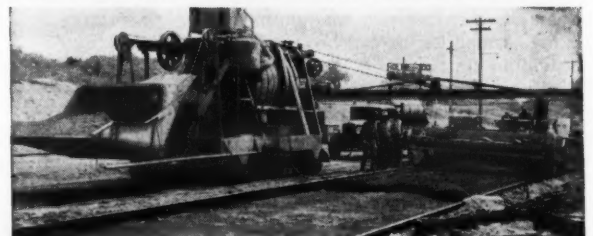
These pictures, taken north of Lynnfield, show recent construction along two adjoining stretches of the new road. Each stretch is approximately a mile in length. One is being built by B. Perini & Sons, Inc., Framingham, Mass., the other by B. A. Simeone, Inc., Medford, Mass. Hinged bar mats, road joints, dowels, cable guard rail and steel posts were furnished by Bethlehem.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

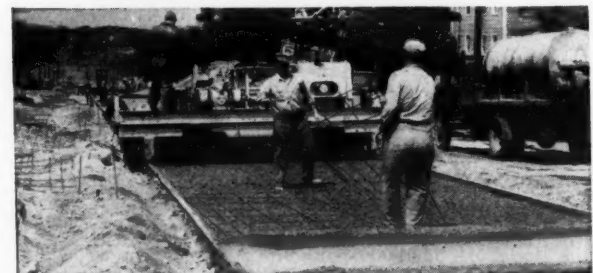
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

STEEL FOR HIGHWAYS

Road Joints • Reinforcing Bars • Bar Mats • Guard Rail
Tie-Rods • Guard Rail Posts and Brackets • Spikes
Wire Rope and Strand • Hollow Drill Steel
Fabricated Structural Steel • Bolts and Nuts
Sheet and H-Piling • Timber Bridge Hardware



Paving in progress. As paver prepares to gulp new load, strike-off spreads first layer of concrete.



A slight push and over it goes. Only two men are needed to place Bethlehem Hinged Bar Mats.



Finished roadway begins to take shape. Here bar mats are in place and final course is being struck off.

KELLY HOSE COUPLINGS

TROJON AIR HOSE COUPLINGS

MALLEABLE IRON—RUST PROOFED



UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from 1/4" to 1".

QUICK-ACTION—Instantly connected or disconnected with one-quarter turn.

TIME TESTED—DEPENDABLE. Manufacturer of these couplings since 1921.

Write for Catalogue No. 110

Distributors in most principal cities

KELLY
CHICAGO

MACHINERY COMPANY
HOSE COUPLING DIVISION
2524 W. MADISON ST. CHICAGO 12

Data on New 10-Hp Engine

Those engineers, contractors, equipment designers, and manufacturers with engine application problems will be interested in a new booklet put out by D. W. Onan & Sons, Inc., 39-51 Royalston Ave., Minneapolis 5, Minn. This booklet, Vol. 3, No. 3, in the "Power Points" series, is fully illustrated and contains complete information on the Onan CK 10-hp engine.

One section of it describes the CK in action, with many photographs and illustrations of the engine in use. Some of the applications listed include small tractors, pumping units, conveyors,

pick-up vehicles, floodlights, welders, etc.

Other features of the catalog include the story of man's struggle to harness power, and the production story of the CK engine from foundry to shipping room.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 26.

Suction Dries Concrete

Literature which describes its process for subjecting wet concrete to a vacuum treatment has been prepared by Vacuum Concrete, Inc., 4210 Sansom St.,

Philadelphia 4, Pa. It is claimed that this process provides the high strength and other advantages of a dry mix without sacrificing the speed of placing, the convenience, or the economy of a wet mix. The vacuum formed is said to pull the excess water from the top of the slab, and in large measure close up the water voids, leaving the equivalent of a dry concrete.

The folder describes how a high vacuum is created within suction mats which are in contact with the concrete in place in the structure. In addition to describing the process, this literature also lists its effects on the quality of the concrete; advantages gained by

its use, and other information of practical interest. Also included is a description of some of the projects on which this process has been used.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 66.

Byrd Heads Asphalt Div.

J. Norman Byrd has been selected to succeed Herschel C. Smith as Manager of the Asphalt Division of the Mexican Petroleum Corp., 122 E. 42nd St., New York 17, N. Y. Mr. Smith was recently elected Vice President of Sales, as well as a Director of the company.

WESTERN FOUNDATIONS for *Industrial Plants*



**Extension
REPUBLIC STEEL PLANT
Cleveland, Ohio**

The mammoth extension of Republic Steel's Cleveland plant stands on WESTERN Foundations . . . one of the biggest pipe pile jobs in the world.

INDUSTRIAL PLANTS from coast to coast rest securely on WESTERN foundations. WESTERN did a big job for industry during the War, successfully handling tough jobs; finding new and better answers to old problems; and demonstrating the knack of adding speed, economy, and safety to foundation work. The quality of this work is gleaned from WESTERN's long and unequalled record . . . every job a success—not one single failure.

WESTERN'S 92 FT. RIGS drove more than 5000 Steel Pipe Piles, 130 ft. to rock, for Republic Steel's Cleveland plant extension . . . a total footage amounting to 110 miles . . . one of the biggest pipe pile jobs in the world! Overall construction time, 8 months.

WESTERN EMPLOYS NO SALESMEN. However, if you have a foundation problem, make use of our **FREE CONSULTATION SERVICE.** A call from you will bring one of our competent engineers on the next plane to discuss your problems with you. Write for Catalog C.

OTHER INDUSTRIAL JOBS now under construction or recently completed include the following typical projects where foundation-types were chosen to meet diversified conditions of site, soil, and load:

GENERAL ELECTRIC CO.—Schenectady, N. Y.

Pedestal Piles, footage 72,500
H-Beam Piles, footage 435,000

NATIONAL GYPSUM CO.—Baltimore, Md.

Button Bottom Piles, footage 49,720

ATLANTIC REFINING CO.—Philadelphia, Pa.

Button Bottom Piles, footage 120,000

CADILLAC MOTOR CO.—Chicago, Ill.

Button Bottom Piles, footage 20,101
Pipe Pile Composites, footage 22,485

PETER CAILLER KOHLER SWISS CHOCOLATE—Fulton, N. Y.

Button Bottom Piles & Pipe Piles, footage 24,863

FOUNDATIONS FOR

INDUSTRIAL PLANTS, POWER PLANTS, BRIDGES, PIERS AND DOCKS, WAREHOUSES,
AIRPORTS, HOUSING PROJECTS, SCHOOLS, COMMERCIAL BUILDINGS, ETC.

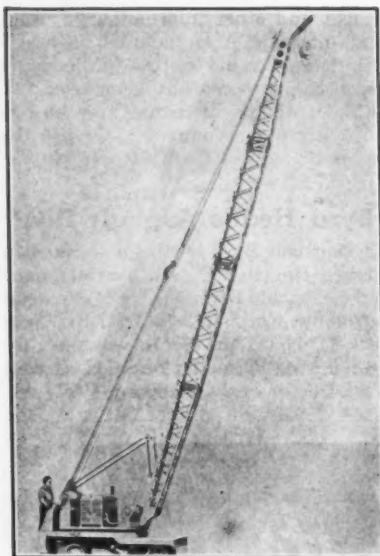
WESTERN FOUNDATION COMPANY

308 W. Washington St., Chicago 6, Ill.

WESTERN CONCRETE PILE CORP.

2 Park Avenue, New York 16, N. Y.





This new Yale & Towne crane truck, with a 40-foot boom, was designed specially for use in the construction and maintenance of high buildings.

Electric Crane Truck Has a 40-Foot Boom

A new crane truck with a 40-foot boom has been brought out by the Philadelphia Division of the Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa. Built primarily as an aid in the construction and maintenance of high buildings, it is also recommended by its manufacturer for lifting material into and out of excavations; loading and unloading ships and rail cars; maintenance and construction of railways; and other hoisting and transportation jobs.

The 40-foot boom is built in 10-foot sections, with the middle two remov-

able when the entire 40-foot reach is not needed. According to the manufacturer, the capacities of the boom at full length are: 4,500 pounds at a 7-foot outreach, 3,620 pounds at 9 feet, and 2,000 pounds at 19 feet. At its shortest length, the boom is said to have a capacity of 10,000 pounds. Outriggers are standard equipment.

The unit has a 270-degree steering radius, and is equipped with a lazy-arm boom stop designed to prevent loads from swinging past the pivot point of the boom. The tires are 22 inches in diameter and are 10 inches wide. The unit weighs 19,880 pounds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 24.

Utility-Size Cleaner

Of interest to shop and automotive-maintenance men is a new model steam cleaner announced by the Homestead Valve Mfg. Co., Hypressure Jenny Division, Coraopolis, Pa. Described as a utility-model steam cleaner, it is said to be of a full-powered all-purpose design for extra-heavy duty.

This model has all the features of the standard Hypressure Jenny steam cleaners, the manufacturer explains. These include instant starting; simplicity of design and operation; rugged welded unit construction; accessibility of working parts; continuous electric-spark ignition; non-clogging heating coil; and pressure-atomizing oil burner. The cleaner is available with a choice of oil or natural-gas burners. Power is supplied by an electric motor or a gasoline engine.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 76.

Data on Large-Size Grader

An 8-page catalog listing specifications and other data on its large-size motor graders can be obtained from the Rome Grader & Machinery Division, The Union Fork & Hoe Co., Rome, N. Y. It features a 2-page center spread of the Rome High-Lift 4.04 and 4.03 graders. The general construction of these two models is the same except

that the 4.03 is smaller.

The catalog lists nineteen advantages which the manufacturer attributes to its grader. It tells how the various parts work, and the purposes for which they are designed. It contains photographs of the units in action, and an entire sheet of specifications covering both models.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 77.

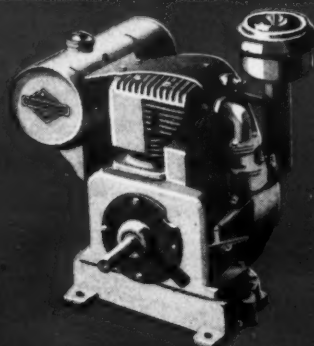
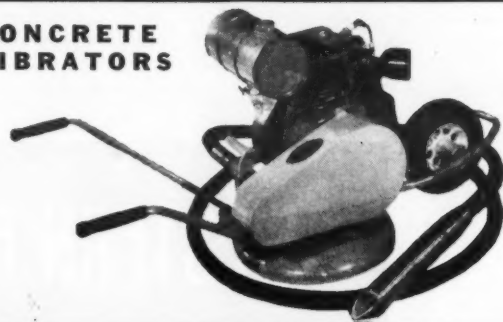
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Asphalt and Tar Kettles *
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GASOLINE
ENGINES

*Preferred
Power*
FOR INDUSTRIAL
CONSTRUCTION
RAILROAD AND FARM
EQUIPMENT

Briggs & Stratton engines have no equal in value and performance... because they incorporate the engineering, technical and manufacturing experience gained in building more than 3¼ million air-cooled engines in the past 28 years of continuous production.

This unmatched experience is the reason why more and more Briggs & Stratton 4-cycle air-cooled engines are "Preferred Power" for an ever-increasing range of applications in every field requiring dependable gasoline power.

BRIGGS & STRATTON CORPORATION, MILWAUKEE 1, WIS., U. S. A.

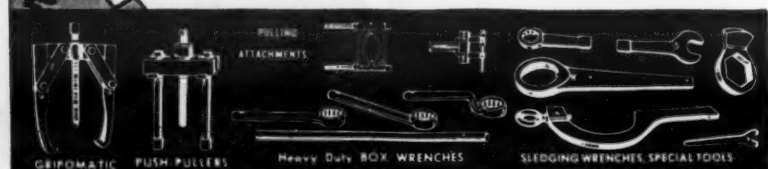


The OTC PULLING SYSTEM makes quick work of removing and replacing gears, bearings, sleeves, wheels, pulleys, shafts and other close-fitting parts—without damage to machinery, without back-straining labor. Approved by Hyatt, M-R-C, New Departure, SKF and Timken for use on their bearings. Portable... as effective for field maintenance and repairs as for shop use.

To meet YOUR Needs—OTC GRIPOMATIC PULLERS, PUSH-PULLERS, Pulling Attachments and Adaptors. Heavy Duty BOX WRENCHES and Special Tools are made in a wide range of sizes and types.

OTC Maintenance Bulletin shows some of the many time-saving uses of OTC TOOLS. Write for a copy.

OWATONNA TOOL CO., 348 Cedar St., Owatonna, Minn.



GRIPOMATIC

PUSH-PULLERS

PULLING ATTACHMENTS

Heavy Duty BOX WRENCHES

SLEDGING WRENCHES, SPECIAL TOOLS

Bridge Will Carry Road Over Railroad

(Continued from page 1)

pleted in October. Difficulty in obtaining structural steel for the superstructure, however, will delay the finish of the contract until some time this winter or early spring.

Five-Span Structure

Rising out of the flat prairie lands in southern Illinois, the reinforced-concrete piers and abutments are supported on creosoted-timber piles. Footings for the abutments measure 63 feet long x 14 feet 6 inches wide x 2 feet 6 inches deep, with the piles projecting 6 inches into the concrete. Each abutment consists of five triangular columns, 2½ feet wide x 14 feet deep with a height of 30 feet 6 inches from the top of footing to the bridge seat. This includes a 3-foot-square cap connecting the five columns.

The four piers, numbered 1 to 4 beginning at the west end of the bridge, have footings 63 feet long x 9 feet wide x 2 feet 6 inches deep. The timber piles also project 6 inches into the pier footings. The piers are likewise constructed in a pattern of five columns which are 2 feet 3 inches square and surmounted by a cap 3½ feet deep. From the bottom of footings the piers average 29 feet high. This gives a 22-foot minimum vertical clearance from the top of rail which is at elevation 527.85.

The structure has a total length of 474 feet 5¾ inches. It consists of two I-beam spans of 48 feet 5½ inches between the abutments and piers 1 and 4; and three deck-girder spans—the center span measuring 147 feet 6 inches and the two adjoining spans each 115 feet long. The I-beam spans are made up of six WF 33-inch 125-pound beams on 6-foot centers. On the other spans the six girders, also on 6-foot centers, are 66 inches deep, back to back of angles.

The steel superstructure will support a 7-inch concrete slab, 26 feet wide, with 2-foot safety walks and a 10-inch concrete hand-rail along each side. Under the center span the steel will be protected from the locomotive smoke and fumes by ½-inch blast plates. At this location the railroad has only a single track, but ample space is provided under the center span for another track to be added.

Excavation and Pile Driving

Work on the project started with the contractor excavating for the east abutment footing. The 4½ to 5-foot-deep hole was dug by a Page 1-yard dragline bucket on a Northwest crane with a 50-foot boom. Into this hole 105 creosoted-timber piles were driven on an average of 3-foot centers. The piles were 18 to 20 feet long with 12-inch butts and 8-inch tips. They were driven to 20-ton bearing in the yellow-clay stratum by a 3,000-pound gravity hammer hung from the 40-foot boom of a P&H crane. The hammer moved in swinging wooden leads 30 feet long. A Mall power chain saw, operated by two men, was used to cut off the piles at the proper level. Only 15 seconds were required to cut through a pile.

The piles were purchased from the Joslyn Mfg. & Supply Co. plant in Panama, Okla., and shipped to the job site by rail. As there was no siding on the Pennsylvania Railroad at this location, the piles were kept on cars in Vandalia until a lapse in the heavy passenger and freight traffic over this line permitted the pile cars to be run out and unloaded. A Traxcavator on a D2, used as a general-purpose rig around the bridge job, snaked the piles over the ground with a steel cable to the respective piers and abutments. The piers averaged 60 piles each.

In preparing the footing for pier 3, which is close to the single-track embankment, 2 x 8-inch sheet piling, 8 feet long, was driven along one side of the excavation. This prevented the possibility of a cave-in. The drop hammer did the driving.

Form Work

Lumber from local sources was used in the form work. A 10-inch-blade table saw powered by a Le Roi gasoline engine cut it to size and shape. The forms consisted mainly of ¾-inch plywood backed with 2 x 6 studs on 12-inch centers, and with double 2 x 6 wales on 3-foot centers. The wall forms were held together with Universal form-clamp tie rods on 3-foot centers,

both vertical and horizontal. The columns or pilasters in the piers and abutments were poured in two lifts, or with a maximum of 15 feet vertical pour. When the lower half of a column was completed, the wales were generally removed the next day, but the panels were left in place until after the upper lift was poured.

Concrete Operations

At the bridge site the contractor set up a batch plant consisting of a Winslow 35-ton Binanbatch with two compartments, one for the sand and the other for the crushed stone. The Burt-schi Sand & Gravel Co. of Vandalia, Ill., supplied the sand, delivering it by truck to the job where it was stockpiled next

to the batcher. The stone was furnished by the East St. Louis Stone Co. of East St. Louis, Ill., 70 miles distant. It was shipped by rail to a siding of the Pennsylvania Railroad in Vandalia where it was stored in a rented bin. Two 1½-ton trucks hauled the stone 3½ miles to the job. The trucks ran under the bin, picked up a load, and moved it to a stockpile close to the batcher.

Bag cement was obtained from the Alpha Portland Cement Co., which shipped it by rail from St. Louis, Mo., to Vandalia. From there it was hauled to the job in trucks and stored under tarpaulins next to the batcher. Reinforcing steel, the remaining principal material of construction, was furnished by the

(Concluded on next page)

Operators know it!

Dynamometer tests prove it!

LaPlant-Choate scrapers load 25% easier!



Gain an extra load every four trips!

Here is positive proof of how you can reduce loading time and gain extra pay-yardage with modern LaPlant-Choate scrapers. In recent field tests conducted with dynamometers, other leading scrapers required a full pound of drawbar pull for every pound of dirt loaded into the scraper bowl—while on the same tests modern LaPlant-Choate scrapers averaged a pound of load with only ¾ pound of pull. This LaPlant-Choate saving of 25% in loading naturally means extra yardage at lower cost. And especially on short hauls, it can often mean an extra "bonus load" every four trips—plus additional savings in tractor operation and maintenance.

Add to these facts, LPC's job-proved advantages in hauling and spreading and it's easy to see that—no matter what kind of scrapers you are operating now, you'll be money ahead by replacing them promptly with modern LaPlant-Choate units. Fortunately, too, you won't have to wait because LPC scrapers in most sizes (from 2 to 14 yards struck measure) are ready for immediate delivery. So don't delay. Contact your nearest LPC dealer today and let him show you how you can reduce costs and increase profits with easier loading, faster spreading LaPlant-Choate scrapers. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Ave., Oakland, California.

and Here's Why!

Low, wide bowl insures bigger loads with less power.

Less weight per yard of capacity.

Modern, open-top design for easy loading by shovel or dragline.

All working force concentrated at center of gravity for easier, more efficient operation.

Bowed offset cutting edge insures better penetration, keeps earth boiling up through center of bowl.

Balanced weight distribution with big tires—completely interchangeable front and rear.

LaPLANT CHOATE

Positive

FORCED EJECTION SCRAPERS

FIRST in Value because they're
FIRST in Performance!

Bridge Will Carry Road Over Railroad

(Continued from preceding page)

Laclede Steel Co. of St. Louis, Mo. The company delivered it to the job by truck.

No water was available in the immediate vicinity of the project, so it was obtained from fire hydrants in Vandalia and hauled to the bridge in a 1,000-gallon tank truck. It was then transferred by gravity flow to a couple of cylindrical 500-gallon storage tanks lying on the ground near the batcher.

A Jaeger 16-S mixer was placed in front of the Binanbatch. After the batches were weighed out on a beam scale and dumped into the hopper, they were run out on a track and emptied into the mixer skip. The cement was added by hand. Water for the concrete was pumped from the storage tanks by a Jaeger 1½-inch pump mounted on the mixer. The aggregate bins were kept charged from the stockpiles by the P&H crane with the 40-foot boom and an Owen ½-yard clamshell bucket. Mixing time was 1½ minutes.

The concrete was discharged into a 1-yard concrete bucket which was then swung over the forms by the Northwest crane with the 50-foot boom. The concrete bucket was emptied into a hopper with 2½-foot sections of metal tremie pipe at the bottom reaching down to the bottom of the pour. The pipe decreased in size from 10-inch diameter at the top to 7-inch at the bottom. As the concrete was placed it was vibrated with a Mall vibrator. Wet burlap was used in curing the concrete.

The dry weights of a typical 3-bag batch were as follows:

Cement	282 lbs.
Sand	635 lbs.
Crushed stone	1,000 lbs.
Water	14 gals.

The gradation of the coarse and fine aggregate in that particular batch was as follows:

Sieve Size	Per Cent Passing	
	Crushed Stone	Sand
1½-inch	100	...
1-inch	80	...
¾-inch	57	...
½-inch	17	...
No. 4	1	99
No. 8	...	88
No. 16	...	72
No. 30	...	16

Quantities and Personnel

The Illinois Steel Bridge Co. of Jacksonville, Ill., will fabricate the structural steel for the superstructure on its low bid of \$67,500. But the erection will be done by the Zimmerly Construction Co. which will also pour the concrete floor slabs. The approach fills will be completed this winter with material excavated from a near-by borrow pit. The maximum dirt haul will be 1,400 feet.

The major items in the contract include the following:

Borrow excavation	20,380 cu. yds.
Concrete	1,414 cu. yds.
Reinforcing steel	188,070 lbs.
Structural steel	809,210 lbs.
Treated-timber piles	8,760 lin. ft.

Wayne I. Zimmerly of the Zimmerly Construction Co. is supervising the work of his 18-man bridge construction crew.

The Illinois Division of Highways is headed by W. W. Polk, Chief Highway



C. & E. M. Photo

At the bridge site Zimmerly set up a Winslow 35-ton Binanbatch, with two compartments, and a Jaeger 16-S mixer in front of it. A Northwest crane swung the 1-yard concrete bucket over the forms for the east abutment, shown in the left background.

Engineer. The project is located in District 7, of which R. H. Major is District

Engineer, with headquarters at Effingham.

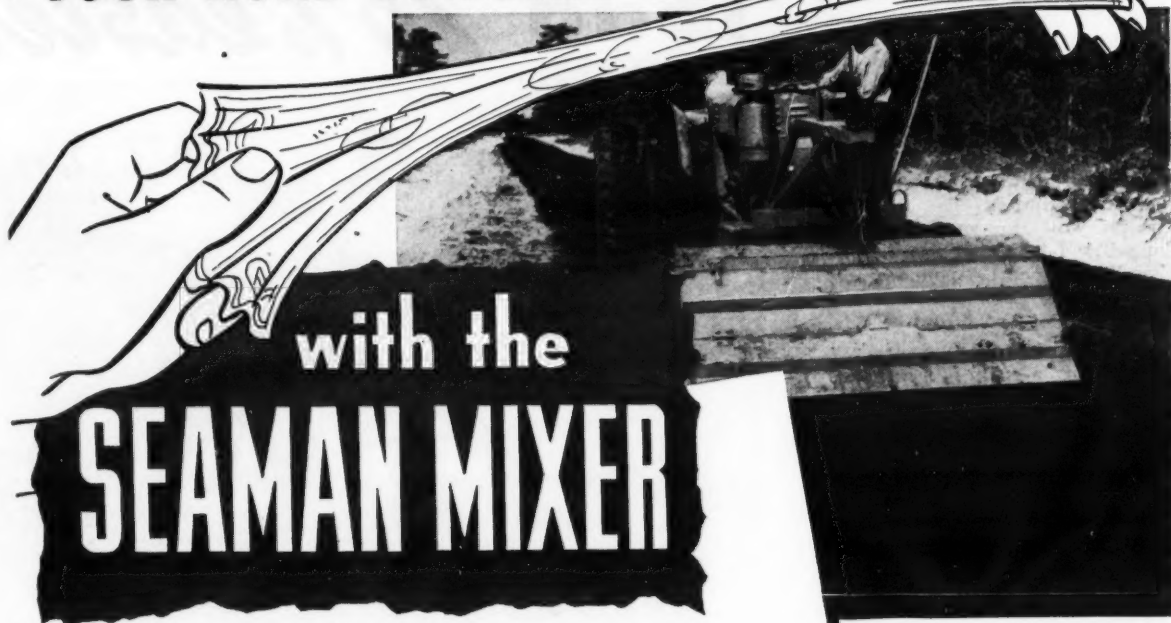
High-Speed Earth-Movers

New features of operation and construction of its high-speed self-propelled earth-movers are described in a 12-page bulletin made available by the Wooldridge Mfg. Co., Sunnyvale, Calif. Bulletin No. TA-750 explains how the Wooldridge Terra-Cobras can be used to gain yardage profits in earth-moving operations. Descriptive data are combined with a number of on-the-job photographs.

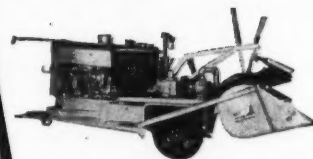
The 2-wheel hydraulic steering action and the flexibly articulated oscillating king-pin pivot are highlighted in this announcement. In all, it covers eighteen features. A double-page spread is devoted to what the manufacturer calls features that spell performance; a page is devoted to the flexible travel allowed by this machine; and still another tells of the heavy-duty construction of the Wooldridge Terra-Cobra.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 80.

STRETCH YOUR ROAD-BUILDING DOLLAR



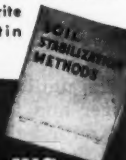
Faced with present day costs in road building, highway authorities and contractors are searching for methods and equipment which will let them get the last possible yard of construction for every dollar invested. And that's why the SEAMAN MIXER is playing an ever-increasing part in all road mix operations. Low in investment (starting for example, at \$869.00) lower in operating cost and maintenance, ready immediately for the job, more versatile in its many applications, the SEAMAN requires less man-power and yet produces a thorough, intimate, homogeneous mix, with excellent control of voids, — and with higher hour by hour, day by day output. That's why experienced contractors agree. The SEAMAN means plant mix quality at road mix cost. And we mean the SEAMAN represents maximum economy in every type of road mix construction! — Bituminous, soil-cement, sand-clay, clay-gravel or calcium chloride, — the SEAMAN MIXER gives you more miles of road for your dollar.



POSITIVE CONTROL OF OIL OR WATER

Equip your SEAMAN with the Auxiliary Spray Bar and Pump. Sprays oil or water directly into mix just ahead of rotor. Avoids migration or evaporation losses. Spray bar available with or without pump.

Here's the book for you. Practical, detailed descriptions of soil stabilization process and many other uses for the SEAMAN MIXER. Write for Bulletin E-25.

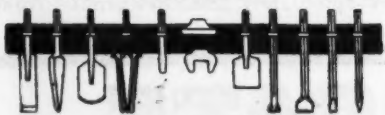


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305 N. 25th ST.

MILWAUKEE 3, WIS.

"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE



The new Simplex bridge jack and bolt puller is designed for lining, shimming, and replacing timber decks on bridges. Capacity of the jack is 15 tons and the bolt-puller attachment handles bolts whose heads are sized $\frac{1}{4}$ to $\frac{3}{8}$ inch.

Jack and Bolt Puller

A new bridge jack and bolt puller has been introduced by Templeton, Kenly & Co., 1006 So. Central Ave., Chicago 44, Ill. The company recommends it for lining, shimming, and replacing timber decks on railroad bridges. Designated as the No. 310, the Simplex bridge jack is said to operate vertically, horizontally, and at any angle when its base locking pawl is released.

The No. 310 can be used for pulling bolts whose heads are $\frac{1}{4}$ to $\frac{3}{8}$ inch. It is held from tipping by a $\frac{3}{8}$ -inch chain. It is designed to lift full capacity on the toe, cap, or at any intermediate point by using the chain as a sling. The jack is available with bases either $3\frac{3}{4}$ or 5 inches wide to permit operation between railroad ties.

It is furnished complete with lever and 5 feet of $\frac{1}{2}$ BBB chain with a grab hook and the bolt-puller attachment. It weighs 66 pounds; will lift 15 tons; is $24\frac{1}{4}$ inches high; lift is 13 inches; and the minimum toe lift is $2\frac{1}{4}$ inches.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 38.

Catalog on Underpinning

A catalog on the use of its underpinning for building construction has been put out by Spencer, White & Prentiss, Inc., 10 E. 40th St., New York, N. Y. This 12-page catalog describes services which the company is equipped to provide—Tuba steel cylinder foundations, Pretest underpinning, Pretest foundations, Drilled-in-Caissons, caisson foundations, foundations under existing buildings, Pretest method applied to other than foundation construction, mass concrete construction, and the heavy shoring and moving of buildings.

The catalog describes the processes and explains their advantages and applications in detail. It describes the method of installation, design, and computation of loads, and lists several structures in which the various processes have been used successfully. The brochure also contains miscellaneous information of value to men engaged in the underpinning and foundation business.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 73.

CSPA Elects President

The election of Maurice Maskrey as its President has been announced by the Clay Sewer Pipe Association, Columbus, Ohio. The association has been without a President since the death of H. C. Maurer two years ago. Benjamin Eisner, Chief Engineer, has guided the association in the interim.

Torque-Converter Tractor

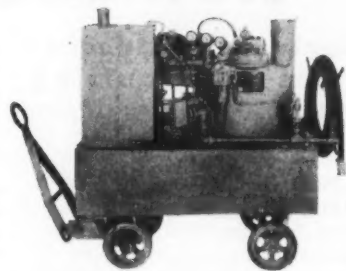
A 6-page catalog on its new HD-19 tractor is now being distributed by the Tractor Division of the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. A 3-page spread lists many features claimed for this torque-converter tractor; these include increased capacity, longer life, operator comfort, 40,000-pound weight, 163 net engine horsepower, and the hydraulic torque-converter drive.

A section of Folder MS-608 illustrates the operator's platform and the 6-cylinder General Motors engine, and shows a cut-away view of the HD-19's truck wheels, said to require lubrication once every 1,000 hours. An underside view of the A-frame points out the strength and rigidity which this type of construction is said to provide. A full page of specifications covers the engine construction, steering design, speeds and drawbar pull, and dimensions.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 72.

Slash Cleaning Costs!

NEW Oakite-Vapor Unit puts the emphasis on speed . . . to save you cleaning dollars. Generates 100 lbs. of steam in 1 minute (rated capacity 200 p.s.i.) when and where you want it. Just flick the switch! Fuel capacity provides 8-hour, non-stop steam-detergent cleaning or paint-stripping cranes, crushers, diggers, excavators. Two-gun cleaning action. Vibrationless operation. No clogging of heater coils, because cleaning solution by-passes coils. Stationary, mobile models available NOW. Write.



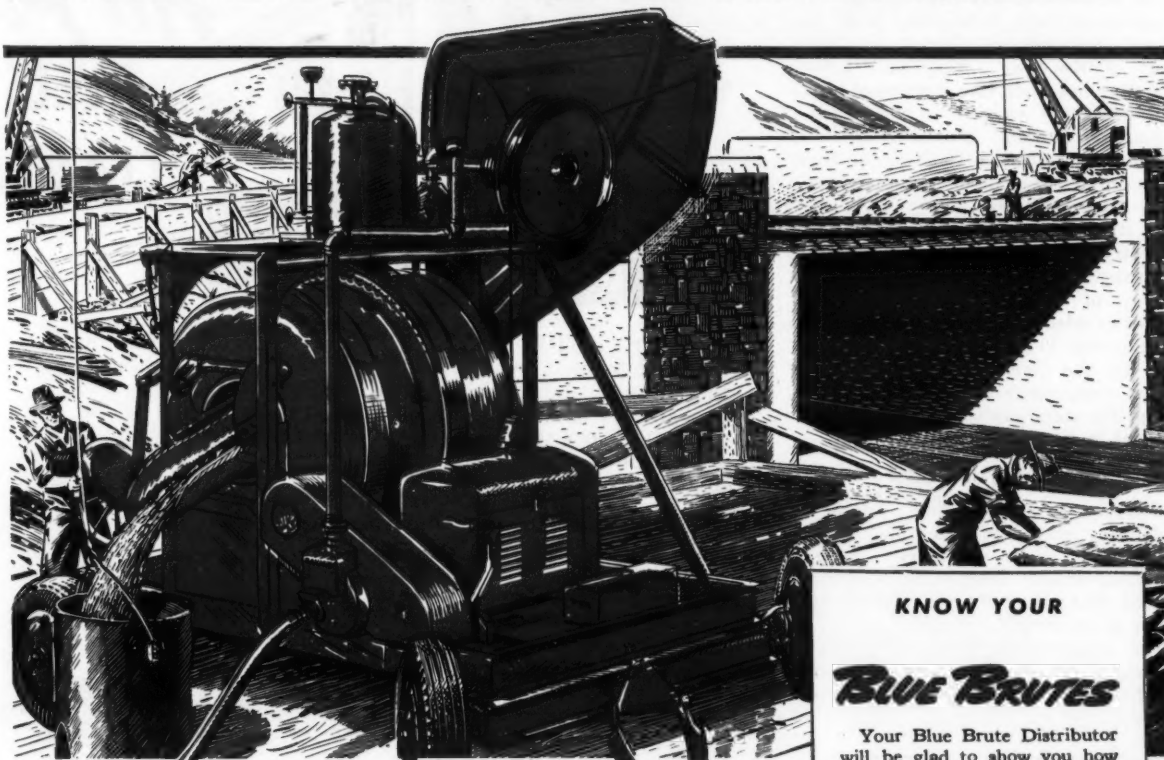
OAKITE PRODUCTS, INC., 72 Thames St., NEW YORK 6, N. Y.
Technical Representatives in Principal Cities of U. S. & Canada

OAKITE

MATERIALS
METHODS
SERVICE

Specialized Industrial Cleaning

HERE'S REAL "MIXING ECONOMY ON WHEELS"



KNOW YOUR

BLUE BRUTES

Your Blue Brute Distributor will be glad to show you how Worthington-Ransome construction equipment will put your planning on a profitable basis.

RANSOME EQUIPMENT

Pavers, Portable and Stationary Mixers, Truck Mixers, Pneumatic Placing and Grouting Equipment and Accessories.

WORTHINGTON EQUIPMENT

Gasoline and Diesel Driven Portable Compressors, Rock Drills, Air Tools, Self-Priming Centrifugal Pumps and Accessories.

WORTHINGTON



Worthington Pump and Machinery Corporation, Worthington-Ransome Construction Equipment Division, Holyoke, Mass.

For getting around in a hurry, with faster, better performance all the way, there's nothing like Ransome's 28-S Portable Mixer. Wheeled wherever you need it, this tireless Blue Brute keeps right on producing more concrete at lower cost—on job after job, year after year. Features like these show you why:

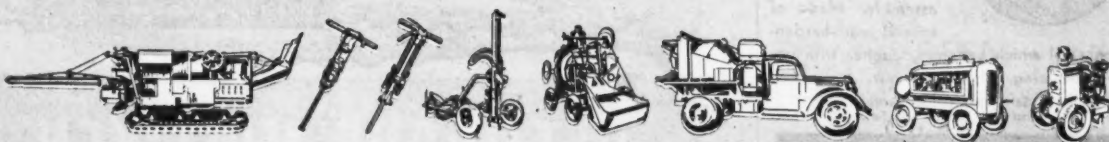
Drum rollers of genuine carwheel metal, turning independently on Timken bearings . . . Roller tracks welded to drum and machined to a true circle, for smoother operation and longer life . . . Extra-heavy, alloy steel roller shafts, adjustable for accurate cen-

tering of drum . . . Two-piece, hydraulically operated discharge chute . . . Enclosed V-Belt drive, with helical gears in an oil bath . . . Ransome's exclusive mixing action, for fast, uniform mixing.

IT WILL PAY YOU

to know all about the 28-S and the smaller Blue Brute Portable Mixers— $3\frac{1}{2}$ -S, 6-S, 11-S and 16-S. Learn how they can help you beat estimates and schedules. See your nearby Worthington-Ransome distributor for performance facts that prove there's more worth in a Blue Brute. RT-7

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

State Is Building New Roadside Rests

Pennsylvania Launches Program by Acquiring Sites for 10 Parks; More Planned for Future

† THE Pennsylvania Legislature, during its 1945 session, passed an act which authorized the acquisition, construction, and maintenance of roadside rests by the Pennsylvania Department of Highways. This step climaxed several years of concerted effort by the State Conservation Commission, by the Pennsylvania Roadside Council and its member organizations, and by other public-spirited individuals and groups.

The act provided for the development of 67 sites, and limited the expenditure per site to \$2,500. However, rapidly increasing labor and material costs compelled a modification passed in 1947, which made available an additional \$1,000 per site.

No positive steps were taken to acquire or develop any sites in 1945; the Department had to contend with too many uncertainties during the final year of the war. Moreover, before plunging headlong into a phase of highway work that was new to many Pennsylvania motorists, it decided to limit the initial program to 10 sites, and from reaction to these developments determine future policies.

In the spring of 1946, therefore, the Forestry Unit of the Department of Highways, was instructed to conduct a survey of the state's major arterial routes to select desirable locations. Approximately 40 sites were chosen. From this list the Chief Engineer chose 10 which were considered most desirable from the standpoints of location and natural features.

Acquiring the Sites

Selecting suitable locations was comparatively easy. But when acquisition proceedings were initiated, serious problems arose. They were so serious, indeed, that only 2 of the 10 sites chosen could be acquired.

The Department then reconsidered its original list of 40 desirable locations, and from among them it obtained ease-

ments for 2 additional areas.

A part of the acquisition difficulty may, perhaps, be attributed to rather formidable policy requirements. These requirements or standards were written into a basic policy covering location and development features considered essential for the successful introduction of this new phase of highway work in Pennsylvania. The policy requires that:

1. Sites be located along main traffic arteries.
2. They be removed from centers of population, so that local citizens may not monopolize the rests.
3. They be located along highway sections where permanent line and grade have been established.
4. They be along tangent sections, or at least along sections where sight dis-



Pennsylvania Department of Highways Photo

Typical of the roadside rests developed to date in Pennsylvania is this one along U. S. 322 in Clearfield County. It is covered with a heavy stand of second-growth hardwoods and some hemlock. Log posts and rails mark off the 18-car parking area and the 18-foot-wide driveways.

stance is sufficient to permit safe ingress and egress.

5. They have available reasonably level areas to permit the development of parking facilities beyond ditch lines.

(Limited funds for development necessitate this stipulation.)

6. They contain a sufficient growth of trees large enough to provide shade.

(Continued on next page)



High Speed Cutting Tools
for Expensive Machines

FRONTS, BOTTOMS, SCOOPS and TEETH shown in yellow on buckets are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.

Experience Counts. See your shovel man or equipment dealer about PMCO Buckets and Dippers.

On the 1/4 yd. and 3/4 yd. Shovel, Pullshovel and Dragline Buckets, all teeth are interchangeable—a great advantage to operators.

Clamshell
Sizes 3/4, 1/2, 3/8, 1/4, 1 yd.

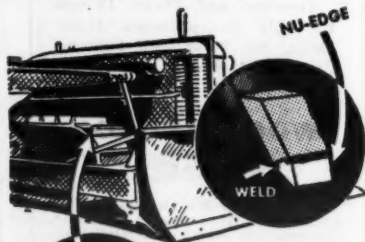
Shovel
Sizes 3/4 to 18 yds

Pullshovel
Outside Cutter Widths:
21", 26", 31", 36", 39"

Dragline
Perforated Sizes 1/4 yd. to 2 yds.
20%-40% lighter than other makes
Solid sizes 3/4 yd. to 2 yds.
Mine Stripping Sizes 2 yds. to 9 yds.

SAVE \$ and INCREASE TRACTOR POWER

The Bulldozer Blade Nu-Edge Bar is butt-welded to new or worn blade and welding bead covered with a thin layer of hard-surfacing electrode—Affording 2000% savings in blade replacements.

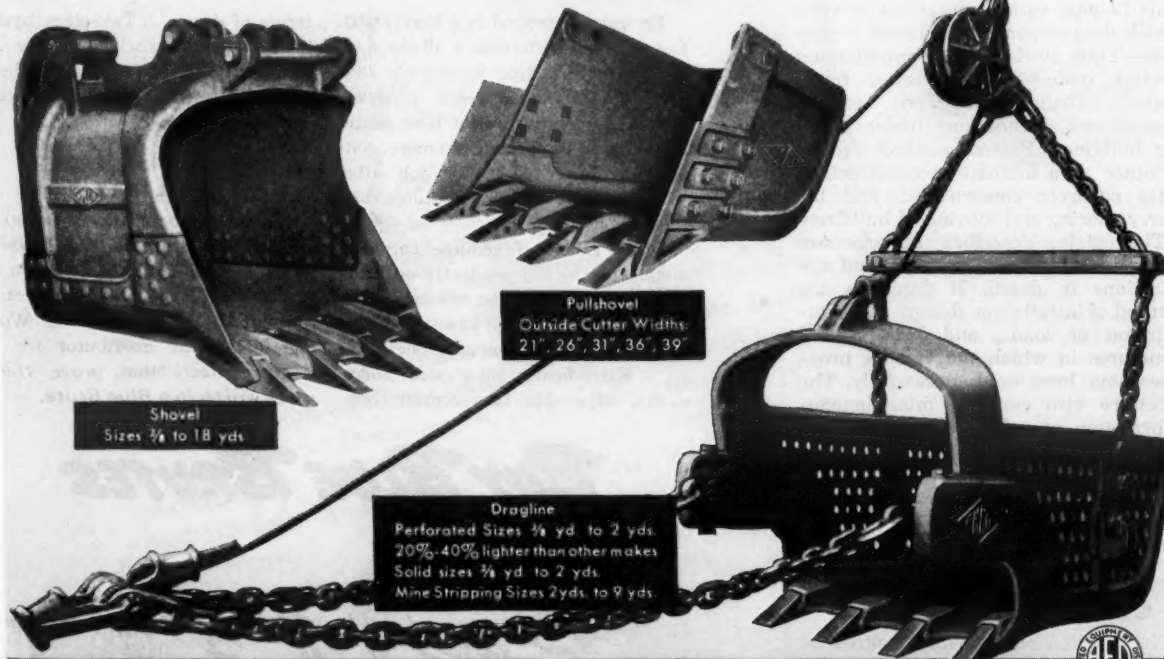


Bulldozer Tractor Grip-Lugs

are easily welded to any size grouser shoe without dismantling assembly. Made of special work-hardening steel which becomes tougher with use—outwearing original grouser.

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ALLIED STEEL PRODUCTS, INC.
1815 BROADWAY • CLEVELAND 5, OHIO



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PETTIBONE MULLIKEN CORP.

CHICAGO 51,
U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

7. They afford drinking water on the area, or that it be reasonably easy to obtain.

8. They be pleasing to the eye and possess characteristics that will be inviting to the motorist.

By November 1, 1947, the Department of Highways had acquired 10 roadside-rest sites—despite these requirements, despite absentee and joint owners, and despite inflated land prices. Of the 10, 3 were purchased and 7 were accepted as grants.

The large percentage of grants is due to two factors: (1) cooperation from other land-owning state departments, and (2) the form of the acquisition document. This document is in the form of a perpetual easement. It provides that the land revert to the owner if the State abandons the site or does not develop it according to plan.

Developing the Sites

Development got under way in September, 1946. At that time grading operations were started on the first site acquired—along U. S. 6 in Bradford County, just east of the Tioga County line.

Maintenance forces did the work under the supervision of the various District Engineers (there are 11 of them in Pennsylvania). A small amount of the construction was done by contract, such as drilling wells or installing pumps. In several instances, lumber companies removed unwanted logs and in turn supplied cut lumber to the Department for use in building the various park structures.

The sites vary in size from $\frac{3}{4}$ to 5 acres, and development plans are designed to make the most of the characteristics of each site. On the average roadside rest, however, the facilities comprise a parking area, combination bench and tables, fireplaces, toilets, pump and shelter, paths, and waste-disposal containers.

Typical Roadside Rest

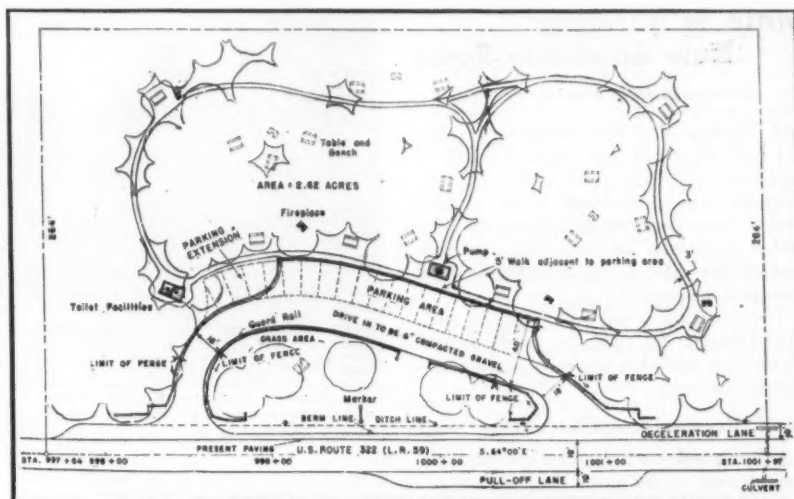
Typical of the rests developed to date is one in District 2, Clearfield County, on U. S. Routes 322 and 219 between Grampian and Dubois. The site was purchased and contains 2.6 acres. It is rectangular in shape with a frontage of 433 feet and a depth of 264 feet. The tract is covered with a heavy stand of second-growth hardwoods and some hemlock up to 15 inches in diameter.

To promote traffic safety, an 8-foot pull-off lane on the opposite side of the

road from the park was provided adjacent to the 18-foot pavement. This permits motorists to leave the concrete before making a left-hand turn. On the side of the road adjoining the park, an 8-foot deceleration lane affords the driver an added degree of safety when leaving or entering the park.

Exit and entrance drives 18 feet wide were built of 6 inches of compacted shale. An 18-car parking area was similarly constructed. Log posts and rails were placed to demarcate it and the driveways. The area is traversed by 3-foot paths made of a 3-inch thickness of gravel.

A pump and shelter is close to the parking area, while scattered over the rest of the site are seven oak picnic tables with side benches. The tables are 8 feet long x 3 feet wide while the flanking benches on each side are 8 feet x 1 foot. All the members are bolted together and thoroughly creosoted except the table tops and seats which are varnished. The table and bench areas are graded and have a gravel surface,



Layout of a roadside rest on Route 322 in Clearfield County, Pa.

or else a concrete slab platform, 6 inches thick, into which the table legs are anchored.

Placed conveniently to the picnic

tables are three stone fireplaces made of large flat native stones on a concrete foundation and with a firebrick hearth
(Concluded on next page)

bought 5 more Jaegers

HERE'S WHY: This 6 months' operating record of their first 4 compressors is the reason why Bell Compressor Rental Co. now owns 9:

Total number of jobs done by four Model 105 units..... 503
Average number of hours worked by each..... 745.7
Average gasoline consumption per machine per hour. 1.35 gals.
Cost of repairs and replacements..... None
Frequency of oil change..... 200 hours



Highlights from Mr. Ferrara's Report:

In the rental business, we are interested in low cost operation and upkeep. With other makes in our fleet of the same age and use, gasoline consumption was higher and repairs amounted to over \$50 for this same period. We have since added 5 more Jaegers as a result.

From over 15 years experience, I say that the Jaeger is the best. It embodies the most desirable features of all compressors, including a large receiver for steady, even pressure; easy starting; easiest to oil, grease and make adjustments—a very important factor.

Our customers feel the same way. With a Jaeger they have no delays or breakdowns and accomplish more work. Time and again, our customers ask us to furnish a Jaeger "Air Plus" compressor on their job.

James Ferrara
Bell Compressor Rental Co., Washington, D. C.

Taps in service, too—"AIR PLUS" Compressors, in 60 to 600 ft. sizes, are sold, rented, serviced in 130 cities of the U. S. and Canada. See your Jaeger distributor.

THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

REGIONAL OFFICES: 1504 Widener Bldg. PHILADELPHIA 7, PA. 226 N. LaSalle St. CHICAGO 1, ILL. American Life Bldg. BIRMINGHAM 1, ALA.



JAEGER Spreaders, Finishers



"SPEEDLINE" Concrete Mixers



"SURE PRIME" Contractors Pumps

JAEGER
Engineered EQUIPMENT
"DUAL-MIX" TRUCK MIXERS, AGITATORS—HOISTING ENGINES, SELF-RAISING TOWERS—CONCRETE AND BITUMINOUS PAVING EQUIPMENT.

CUMMER ASPHALT PLANTS

EIGHT SIZES
Up to 1000 Tons per day

DRYERS
Two-Fire and Internal Fire
30 to 100 Tons per hour
Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

EAST 17th & EUCLID
CLEVELAND 15, OHIO

State Is Building New Roadside Rests

(Continued from preceding page)

and lining. The fireplaces are about 5½ feet long x 4 feet wide x nearly 2 feet high, with the open end or mouth towards the prevailing wind. More tables, benches, and fireplaces may be added in future development. At one end of the site are toilet facilities for men and women.

The roadside rests are kept as natural-looking as possible, and if any planting is added it is of a type indigenous to the area.

Roadside-Rest Locations

Other roadside rests in Pennsylvania are located as follows:

1. U. S. 611, Monroe County, 2 miles north of Bartonsville.
2. U. S. 6, Tioga County, between Gaines and Ansonia.
3. U. S. 309, Bucks County, between Quakertown and Lansdale.
4. U. S. 15, Lycoming County, between Williamsport and Lewisburg.
5. U. S. 1, Delaware County, between Media and Kennett Square.
6. U. S. 220, Sullivan County, between Sonestown and Laporte.
7. U. S. 322, Mifflin County, between Lewistown and State College.
8. U. S. 62, Venango County, between Oil City and Tionesta.

After a partial season of use of a few yet uncompleted roadside rests, it is quite evident that the motorists of Pennsylvania, not to mention those from other states, will use to the fullest extent this comparatively recent addition to the highway-development program. If use and highly favorable comments may serve as a guide to determine future policies, then it can be predicted that no effort will be spared to acquire and develop additional desirable sites. The costs involved are small compared to the benefits in pleasure, convenience, and safety contributed by the roadside rests.

Personnel

The roadside-development program in Pennsylvania is under the direction of Wesley L. Hottenstein, Supervisor of Highway Forestry, assisted by A. J. Piccola, Landscape Architect. The Pennsylvania Department of Highways is headed by E. L. Schmidt, Chief Engineer.

Catalogs Describe Crane, Trailers, and Excavators

Literature about its line of equipment can be obtained from The Hanson Clutch & Machinery Co., Tiffin, Ohio. One bulletin is devoted to a discussion of the Hanson excavators; another covers the yard and dock crane; while others describe the various machinery and hauling trailers made by Hanson.

There is a 12-page catalog which gives complete information on the No. 31 and the No. 41 Hanson excavators, which can be used as shovels, cranes, draglines, trench-hoes, and clamshells. Their component parts are shown.

The 8-page folder on the yard and dock crane features a description of the many uses for which the manufacturer has designed this piece of equipment. It shows how the unit raises the boom, lifts and swings a load simultaneously. It describes the features of this unit, and lists its specifications.

Other pieces of literature cover the company's 10-ton gooseneck trailers; the 15 and 20-ton gooseneck heavy-duty trailers; and the gooseneck heavy-duty machinery trailers.

Copies of this literature may be obtained from the company by mentioning the kind and size of equipment desired. Or use the enclosed Request Card. For information on the excavator, circle No. 96; for the yard and dock crane, No. 97; for trailers, No. 98.



Pennsylvania Department of Highways Photo

This view shows the approach to a roadside rest in Tioga County, Pa. The small pines at the left and in the center of the island were planted to cover a barren area. They appear to be native growth.

Data on Piles and Caissons

Information on its line of concrete piles and caissons is contained in a catalog obtainable from the Western Concrete Pile Corp., 2 Park Ave., New

York 16, N. Y. This catalog describes the button-bottom pile, projectile pile, composite pile, compressed-concrete pile, caisson pile, and the Drilled-In Caisson.

A page of this catalog is devoted to a

brief list of standards set up for the various types of piles and their characteristics. It also discusses the column versus the taper.

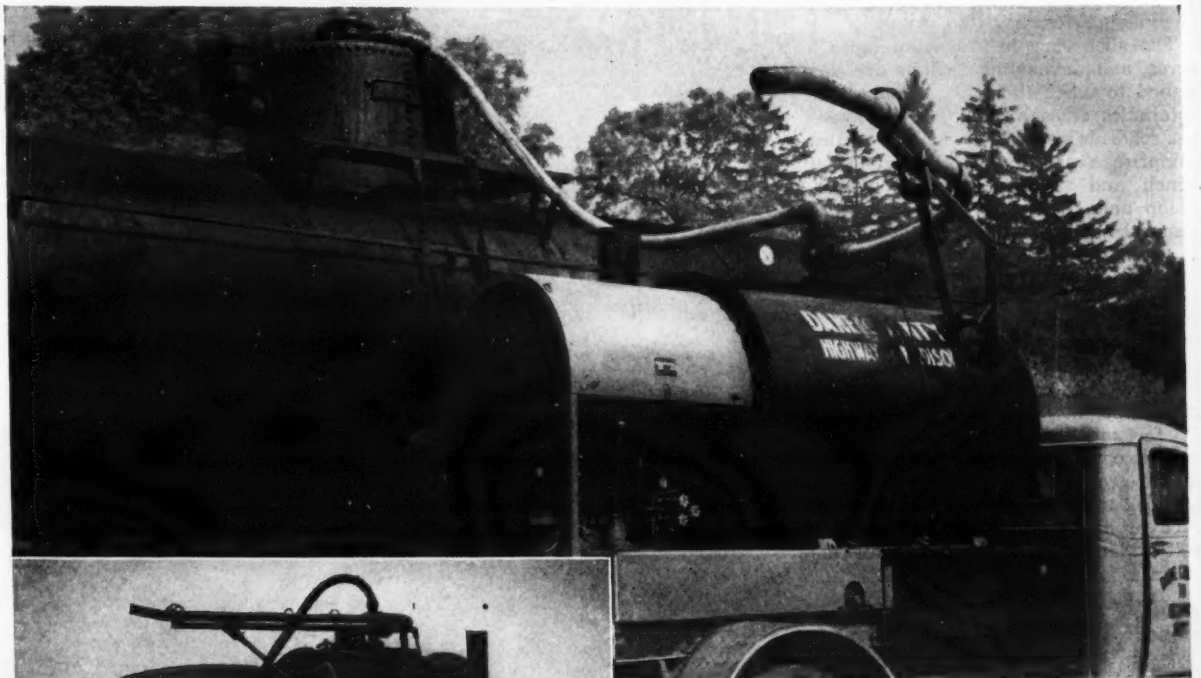
Each type of pile is given an entire page of the catalog. Drawings illustrate the construction and the appearance of the pile when in place. Accompanying text covers specifications, advantages, etc.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 90.

Western Dealer for GM

The Colorado Builders Supply Co. Equipment Division has been appointed industrial distributor for the General Motors Series 71 diesel engines. This new distributorship covers the state of Colorado with the exception of Moffat and Rio Blanco counties, plus the Nebraska counties west of and including Sheridan, Garden, and Deuel. The company has offices in Denver, Colo., and Scottsbluff, Nebr.

All hooked up and ready to deliver hot oil . . . fast!



Truck-mounted Booster. Heats by direct firing. Loads direct to distributor or returns to tank car. 2 sizes for truck or trailer mounting.



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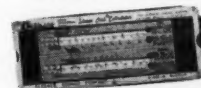
- Heats material 3 times as fast as steam.
- Heats to higher temperatures.
- No steam or water necessary.
- Heats only amount of material required.
- Circulates material while heating—no separation or damage—assures uniform application.

You Get All the Hot Material You Need Right When You Need It — With Cleaver-Brooks Portable Boosters

CLEAVER-BROOKS Portable Pumping Boosters get pumpable bituminous materials out of tank cars and raise it to desired temperatures in almost unbelievable speed.

With Cleaver-Brooks Boosters, the heating speed does not depend on the size and conditions of tank car coils. It heats direct and 3 times as fast as any other method. What's more, you need only heat the amount of material you need — no heating of the entire car.

Cleaver-Brooks Boosters are reliable, long service, low maintenance units. Most of the original models, built 15 years ago are still giving dependable every day service. There are more Cleaver-Brooks units in service than any other make. For full details write for bulletin RM 102.



Write on Your Business Letterhead . . . For the Bituminous-Mix Calculator—a ready reference slide rule showing weight of mix needed in lbs. and tons based on area and depth of area to be covered.

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TANK CAR HEATERS . . . BITUMINOUS BOOSTERS . . . AUTOMATIC STEAM PLANTS

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Verbal Agreement Allowed; No Final Contract Recorded

THE PROBLEM: Defendant sublet to plaintiff the spreading and compacting of gravel on a highway job. The contract was evidenced by preliminary oral negotiations and three communications. But these failed to culminate a definite contract on all essential terms. Plaintiff sued for damages on the ground that he had been delayed in doing the work; that defendant had not furnished gravel fast enough for plaintiff to spread the gravel at the rate of 1,000 cubic yards daily.

(1) Could plaintiff show that before the written communications were exchanged, defendant agreed to furnish sufficient base gravel to utilize 1,000 cubic yards of gravel per day?

A second problem arose when defendant failed to produce in court books in its possession, which would have permitted precise computation of plaintiff's damages. (2) Could defendant complain that damages awarded were approximated upon the best data available?

THE ANSWERS: (1) Yes and (2) No, said the Michigan Supreme Court. (Brady v. Central Excavators, Inc., 25 N. W. 2d, 630.)

(1) The court fully recognized this fundamental rule of law: that the terms of a written contract cannot be altered or contradicted by showing that in the course of preliminary negotiations a verbal agreement was reached on a given point. Such agreements are supposed to be mutually intended to be merged into the written contract. But the court decided that plaintiff was entitled to prove this particular verbal agreement, as to defendant furnishing base for spreading 1,000 cubic yards per day. This was its reason: the agreement was not altered or superseded by the subsequent written communications, which did not amount to a purportedly complete contract between the parties.

(2) The court also recognized that ordinarily one claiming damages must prove more than a basis for approximating damages. But it decided that defendant could not complain that some approximation was used in assessing plaintiff's damages. For defendant's own books contained data upon which an accurate computation could be made, but defendant failed to produce them.

Carrier's Demurrage Claim Against Contractor Upheld

THE PROBLEM: A highway contractor gave a bond to pay for labor, materials, and services used in performing his contract. He shipped ten cars of gravel for use on the job from one point to another within Nebraska. Due to frozen condition of the gravel on its arrival at the destination, unloading was delayed many days beyond the free time allowed under the railroad's tariff schedules. The delay was increased by the railroad company's refusal to furnish steam or water to thaw the gravel. The company sued for accrued demurrage charges and interest. Were the contractor and his surety liable?

THE ANSWER: Yes, said the Nebraska Supreme Court. (Chicago & North Western Ry. Co. v. Mallory, 23 N.W. 2d 735.)

As to the surety's liability, the court pointed to a decision of the United States Supreme Court, to the effect that transportation of materials constitutes "labor" within the meaning of a public contractor's bond to pay for "labor and material". It added: "Inasmuch as demurrage is a part of transportation charges, such an item is a proper charge against the contractor's bond along with the labor and materials."

As to the propriety of assessing demurrage charges in the particular case, the Nebraska court reached these conclusions:

Both carrier and shipper are bound by established tariffs, as fully as if they were fixed by statute. The carrier is bound to collect the tariff rates and the shipper is bound to know what those rates are. (Only in this

way can carriers be prevented from unjustly discriminating between shippers.) Demurrage charges are on the same plane as regular freight charges in this respect.

No services may be afforded shippers other than those covered by the regularly established tariffs. Therefore, since there was no tariff covering the furnishing of steam or water to facilitate unloading of frozen gravel, the railroad company was not bound to furnish the same. Its failure to do so did not prevent accrual of demurrage charges; in fact, it would have been unlawful to furnish such service.

The tariff covering the gravel did provide for additional free time for unloading in the case of delay caused by weather, on condition that certain notice be given the railroad company. No such notice was given in this case.

The court approvingly cited a decision of the West Virginia Supreme Court of Appeals to this effect: that demurrage is not collectible when delay in unloading is not only ren-

dered difficult but impossible by an act of God or by some other overwhelming force such as strike picketing by armed men.

Haulage Contractor Held Liable for Own Neglect

THE PROBLEM: A motorist was injured on a highway undergoing repairs, when a truck unloading material was carelessly backed into his car. The truck was owned and operated by a haulage contractor under contract with a subcontractor.

The haulage contractor was free from control by the general contractor and the subcontractor, except that he was to receive materials at a plant and dump them at places on the highway site designated by an employee of the general contractor. Was either the general contractor or the subcontractor liable to the motorist?

THE ANSWER: No, said the Texas Court of Civil Appeals. (Layton v. Waltermire, 197 S. W. 2d, 858.) The haulage contractor was an independent contractor. He was not an "employee" of the general contractor or the subcontractor, because he was not subject to control as to how he transported the material. Their only interest was in having the material moved from the plant to the unloading spots.

The court applied a rule that has been frequently enforced by state and Federal

courts throughout the country: "One who engages the services of another to achieve certain results, but who has no control nor right to control the details of the physical movements necessary to achieve them, is not responsible for incidental negligence of the one so engaged while he is performing the work which he is engaged to perform."

It should be added, however, that an exception to this rule is generally applied where the construction work is inherently dangerous.

Contractor Must Facilitate His Subcontractor's Work

THE PROBLEM: Was a highway contractor bound to complete a macadam base within a reasonable time after work was commenced, so as to facilitate a subcontractor's laying a bituminous surface?

THE ANSWER: Yes, decided the United States District Court, Eastern District of Kentucky. (National Surety Corp. v. Allen-Codell Co., 70 F. Supp. 189.)

The principal contract required work to begin within ten days and to be completed within eight months. The subcontract did not specify time for its performance. However, the court decided that, because the surface could not be applied until the base was completed, the contractor was impliedly bound to complete it in a reasonable time.



1,500,000 TONS
of aggregate for
huge dam project
furnished by . . .

TELSMITH

CRUSHING AND SCREENING PLANT

U. S. Army Engineers are building the huge Center Hill Dam in Tennessee. It will require 1,500,000 tons of aggregate—4 sizes of crushed rock: 3"-6", 1½"-3", ¾"-¾", minus ¾"; and one size of sand.

To produce this material, Ralph E. Mills Co., of Roanoke, Va., opened a quarry at the dam site. The rock is a high calcium limestone. Telsmith designed the complete crushing and screening plant, and furnished most of the equipment. Capacity is in excess of 200 tons per hour.

On large construction jobs, equipment as well as

men must produce more and faster without "cracking" under the strain. For years Telsmith has been building equipment that can turn it out, without taking time out. Telsmith complete sand and gravel and rock crushing plants are a *known quantity* to miners, contractors and aggregate producers.

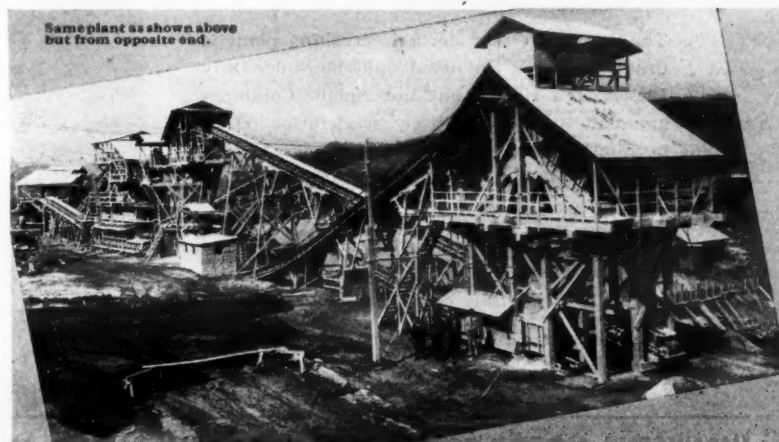
That's why Telsmith gets the call on so many large jobs—to build super highways, dams, air fields and other big construction projects.

You can get Telsmith equipment for all your needs. Send today for descriptive Bulletin Q-34.

Q-34

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- One 36" x 131' Telsmith Belt Conveyor
- Two 4' x 12' Telsmith Double Deck Pulsator Screens
- Two 18" x 21' Telsmith Belt Conveyors
- Two 4' x 10' Telsmith Single Deck Pulsator Screens
- Twelve Telsmith Bin Gates
- Three 18" Telsmith Belt Conveyors
- One 18" x 105' Telsmith Belt Conveyor

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Low Prices—Immediate Delivery

Size	11.6 oz.	12.29 oz.	14.90 oz.	18 oz.
15x20	\$22.50	\$27.00	\$31.75	\$36.07
20x30	45.00	54.00	63.36	68.70

Freight paid on orders of five or more.

All sizes available at corresponding prices.

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Air Entrainment Aids Pouring Dam Concrete

Use of Air-Entraining Agent in Mix Which Contains Manufactured Sand Improves Workability and Strength: Problem of Excess Fines

† ONE of the newest contributions to concrete technology is playing an important role in concreting operations at Allatoona Dam (See C. & E. M., Oct., 1947, pg. 2). This 1,250-foot-long gravity-type concrete structure is being built on the Etowah River in Georgia as a flood-control and hydroelectric project. The \$13,282,088 contract was awarded to National Constructors, Inc., by the Corps of Engineers, U. S. Army, and calls for placing 517,450 cubic yards of concrete.

The fine as well as the coarse aggregate for the concrete is being manufactured from local sources of rock. The use of manufactured fine aggregate instead of natural sand usually produces a harsh unworkable concrete because of particle shape and size gradation. But this problem has been solved at Allatoona by the use of an air-entraining agent in the mix and rigid control of particle shape and gradation. It is reported that laboratory tests by the U. S. Engineers showed also that, without air entrainment, the excessively high water-cement ratios necessary would have impaired both the strength and cohesiveness of the concrete.

As a result of considerable exploratory work, the U. S. Engineers specified air entrained in the mix in the amounts of 4½ per cent plus or minus 1½ per cent in the concrete containing 1½-inch aggregate and less. In order to comply with these specifications, complete equipment for handling additions of the air-entraining agent was set up at the mixer. This included a large storage tank on top of a hill near the water-supply tank, and fully automatic proportioning equipment in the central mixing plant. This electronically operated proportioning device was developed especially for the Allatoona job by the engineers of Dewey & Almy Chemical Co., producer of Darex AEA air-entraining agent.

Excess Fines

Because of the crystalline characteristics of the rock used for aggregate, excessive quantities of very-fine particle sizes (minus-200-mesh material) are produced. It has been well established that surplus fines inhibit the entrainment of air in concrete. So the specifications called for a dispenser at the mixing plant that would allow an adjustment in the quantity of AEA added. The use of this dispenser proved to be necessary to take care of the varying amounts of these surplus fines in the aggregate.

The addition of an air separator to replace a wet classifier produced a sand with a smaller per cent of minus-200 material without removing any of the scarce 50 to 100-mesh material. This change allowed a reduction of AEA from 2.8 ounces to 2.1 ounces per bag of cement on a three-bag mix.

The cement used on this job is a blend of 80 per cent portland and 20 per cent by volume of slag cements.

How-to-Run-a-Lathe Book

A 128-page book of instructions titled "How to Run a Lathe" has been issued in a new edition by the South Bend Lathe Works. This revised 45th edition is said to contain the latest information on the operation and care of metal-working lathes.

Some of the subjects covered are the operation of the lathe units, grinding cutter bits, making accurate measure-

ments, plain turning, chuck work, taper turning, boring, drilling, reaming, tapping, and cutting screw threads. Reference tables are included.

Written in a clear and concise style, it is designed for use by machinists, as a shop text in schools, and for apprentice-training courses. Its dimensions are 5½ x 8 inches and it contains over 365 illustrations.

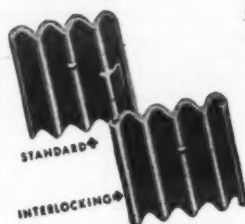
Copies of this book can be obtained by writing to the company at 114 E. Madison St., South Bend 22, Ind. Post-paid copies cost 25 cents each in the paper-covered edition, and \$1.00 with leatherette covers.

Lima Personnel Notices

M. E. Army, Assistant District Manager for the Lima-Hamilton Corp., Lima Shovel & Crane Division, died recently at his home in Glendale, Calif. He had been with the company for 19 years.

W. D. "Pete" Haley has been named District Manager for the Pacific northwest territory.

NOW Rolled from Alloy or Mild Steel



Caine CORR-PLATE Steel Piling

Roller from a new steel alloy, Caine Corr-Plate is now 25% stronger and has nearly 100% greater corrosion resistance. This alloy makes available equal strength and nearly double the life in a 25% lighter piling. Approved by Highway Departments and U. S. Engineers.

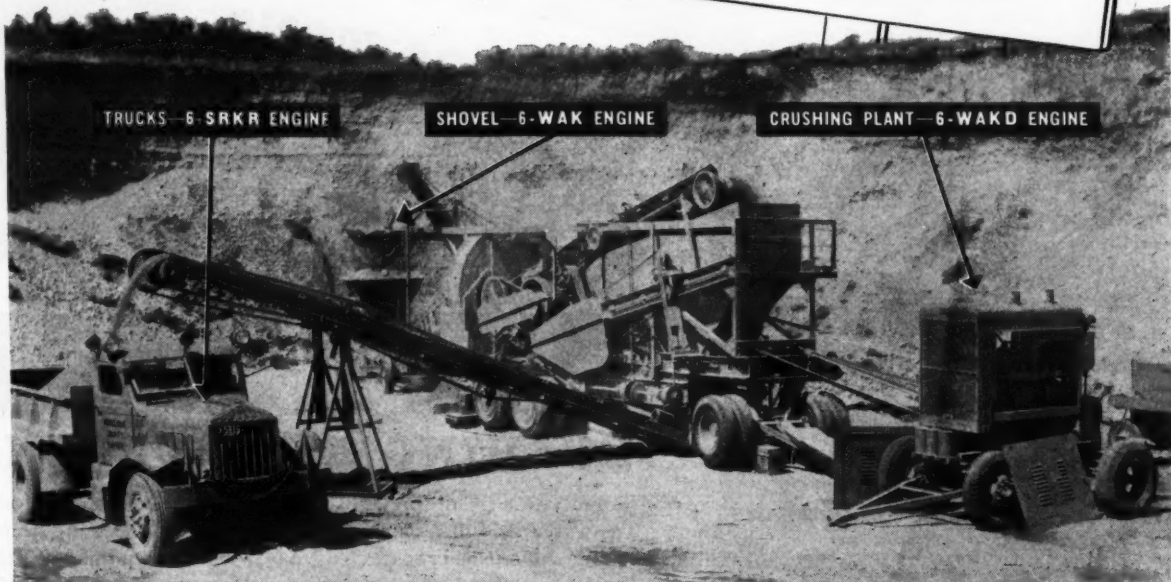
Caine Corr-Plate Steel Piling has been used the world over for Foundations, Dams, Retaining Walls, Docks, Levees, Bulkheads, Sewers, Disposal Plants and hundreds of other jobs—it's stronger, lighter, nestable, easy to drive and water tight; can be re-used again and again. Doubled life and 25% greater strength make Caine Corr-Plate Steel Piling the bargain buy in piling!

**NOW, MORE THAN EVER BEFORE . . .
STRONGEST PER POUND WEIGHT
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WAUKESHA ENGINES

You want aggregate to keep moving. Digging it . . . crushing and screening it . . . and hauling it. You want it to move swiftly and smoothly.

That's what is happening here. Waukesha County is turning out aggregate for its secondary highways. And all the power—for the excavating shovel . . . for the crushing plant . . . for the trucks—is Waukesha Power!

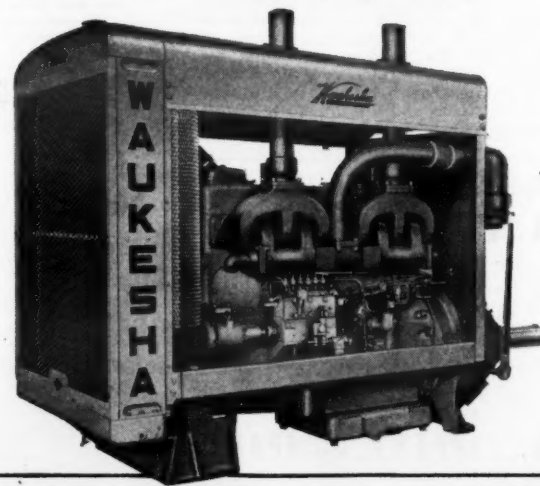
The Austin-Western portable crushing plant is driven by one of the new Waukesha Super Duty Diesels. It's rugged but not rough. Combines abundant power with lively acceleration, clean burning, prompt starting and greater fuel economy. (Get the story in Bulletin 1418).

The truck—one of Waukesha County's three 5-ton dump trucks on this operation, all Waukesha powered—has a 6-SRKR Waukesha Engine, 6-cyl., 45½" x 5½", 517 cu. in. (get Bulletin 1124).

The shovel has a Waukesha super duty 6-WAK

gasoline engine—6 cyl. 6¼" x 6½", 1197 cu. in. (get Bulletin 1138). Consult Waukesha engineers about all your power needs.

SUPER DUTY DIESEL Model 6-WAKDU Power Unit six cyl., 6¼" x 6½", 1197 cu. in. 190 hp. max. rating at 1300 rpm.



WAUKESHA MOTOR COMPANY • WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES



This gentleman has a right to look jaunty. He is Frank Heffernan, General Superintendent of a straight-line gravel plant on one of Henry J. Kaiser's enterprises. He is demonstrating the demountable-rim sheave developed on his job, which has drastically cut replacement, shut-down, and wire-rope costs.

Sheave With Demountable Rim and Groove Cuts Costs

A sheave with a demountable rim has cut replacement cost and increased the life of wire rope, reports Frank Heffernan, General Superintendent of one of Henry J. Kaiser's enterprises.

Mr. Heffernan is in charge of a straight-line gravel plant in which the aggregate comes from a natural-glacier deposit. The pit draglines are equipped with 2½-cubic-yard buckets, and have 750 feet of IPS hemp-center 1-inch preformed wire rope as main line. The haul-back lines are ¾-inch hemp-center preformed wire rope and are 1,600 feet long. Some 20 feet out from the drum is a 14-inch sheave. The main line traveling over this sheave groove acts as a fine-grinding emery. Due to the fact that the main line gave but half the life which should have been received, Mr. Heffernan set about perfecting the sheave with a demountable rim and groove.

From a conventional 14-inch sheave, the groove was cut off and put on a demountable rim. With six ½-inch bolts and lock washers on centers, this groove can be changed without replacing the entire sheave. It was necessary, because of the heavy wear on the rope through the groove, to cast the groove from medium-hard manganese steel.

The demountable rim and groove cost about one-fifth as much as a replacement, says Mr. Heffernan. In addition to this, the company has more than doubled the life of the wire rope it uses. There is no costly shut-down, as the groove replacement requires only about 5 minutes, and groove life is said to have increased tenfold.

Engineering Handbook

A revision of Waterbury's vest-pocket "Handbook of Engineering" has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. This new fourth edition has been revised by H. W. Reddick, W. M. Lansford, C. O. Mackey, H. H. Higbie, and H. S. Bull. It is designed to present easy access to basic data and formulae for quick and accurate mathematical calculations; it sells for \$2.50.

The material is presented under these headings: algebra, trigonometry, mensuration, analytic geometry, differential and integral calculus, theoretical mechanics, mechanics of materials, mechanics of fluids, heat engineering, and electrical engineering. New sections have been added to cover illumination engineering, and radio and electronics formulae.

Besides the tables revised from the previous edition, the book contains new ones on (1) the properties of saturated water and steam, (2) the properties of saturated water and steam (temperature table), and (3) the properties of superheated steam.

Portable Gravel Plant

A bulletin describing the features of its TwinDual Master portable gravel plant has been made available by the Universal Engineering Corp., 620 C Ave., Cedar Rapids, Iowa. According to Bulletin No. 682 one plus one can sometimes equal three—one jaw crusher plus a TwinDual roll crusher equals three stages of reduction in this single-unit gravel plant.

The catalog shows pictures of the component parts of the plant; accompanying text lists the operational features and uses of these parts. The items so described are the screen, V-belt drives, Rotovator, self-cleaning pulley, chip screen, and swivel drive. Feature billing goes to the streamline roller-bearing jaw crusher, shown in cutaway section and assembled; and to the TwinDual roll crusher. A large spread shows the plant in operation.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 55.



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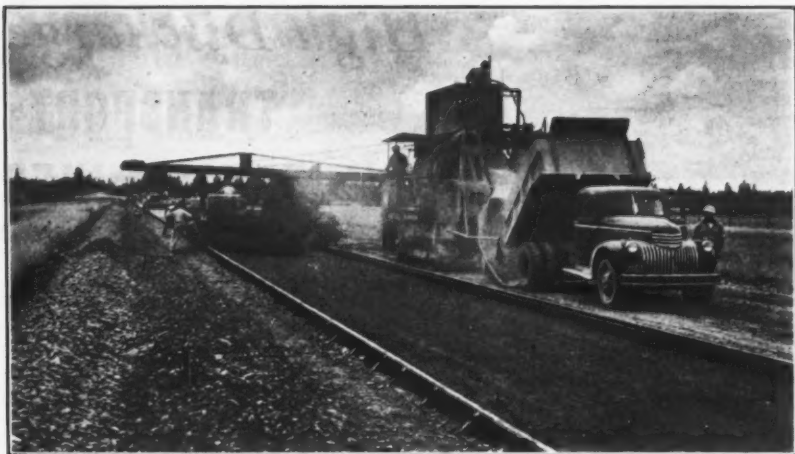
Regardless of what model you use, when you use a YAUN, every trip carries a full load. Operators prefer YAUN buckets because they handle easier, dump faster and cleaner. There is no lost motion with a YAUN. For the next job, be sure, save money, and order a YAUN.

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DRAGLINE BUCKETS AND MFG. PLANT

BATON ROUGE, LA.



C. & E. M. Photo

As finishing machines work in the background, this Koehring dual-drum 34-E paver dumps a batch on the grade. It was equipped with a 30-foot boom, and the bucket had dual gates. One of the best 8-hour runs on this Oregon job was 2,600 feet.

Concrete Is Laid On Strategic Link

**14 Bridges Hamper Crews
As Northbound Half of
Ultimate 4-Lane Highway
Is Paved by Contract**

† TWO 12-foot lanes of the new relocated section of U.S. 99E north of Albany, Oreg., have been paved with 8 inches of portland-cement concrete by Warren-Northwest, Inc., of Portland. The 9.85-mile section under construction last summer comprised two contracts, totaling \$950,000, with the Oregon State Highway Commission.

Ultimately the new relocation will have four lanes of traffic, separated by a dividing strip. The work done by Warren-Northwest was on what will then be the northbound lane. It will, of course, carry two-way traffic until all the four lanes are built.

Fourteen bridges which span drainage ditches, creeks, and the Santiam River slowed paving down somewhat, but the work proceeded on one 12-foot lane at the rate of about 2,500 feet each 8-hour day.

The section has a 24-foot-wide paved concrete surface, with 10-foot shoulders finished on a 3 to 1 drop slope. The shoulders are built of river gravel, with 2 inches of ¾-inch-minus rock, compacted to grade, on the top.

With the exception of transitions at the bridges, all paving is 8 inches thick. At the bridge abutments it is thickened, and reinforced in some cases. Also, expansion joints were reserved only for the joint at the bridges.

The preparation of roadbed, and the 3-inch stream-bed alluvial-gravel sub-base was a part of the Warren-Northwest contract, and was under way officially beginning May 28, 1945. Concrete paving began on June 23, 1947, and was finished by September 1.

The new route is all on new location. Designated as a part of the Federal strategic highway system, it replaces the twisting old 20-year asphalt highway north of Albany. Completion of this contract makes U. S. 99 fast,

straight, and capable of taking 60-mile-an-hour traffic between Salem and Eugene.

Preparation of Subgrade

The 3-inch sub-base of rounded 3-inch-minus stream-bed cobbles was rather uneven after motor graders succeeded in blading the material to grade, so it was rolled several times by an Austin 12-ton 3-wheel roller. After the forms were set, a leveling course of ½-inch-minus fines was dumped and spread ahead of the paver by a Caterpillar No. 212 motor grader.

Warren-Northwest brought 15,000 linear feet of Blaw-Knox 8-inch steel road forms in to the job, but since two sets of forms were required on the first lane the effective footage was 7,500 feet. For the most part, all this footage was constantly being set, and efforts were made to keep the forms a mile ahead of the paver. The day's work for the form crew was figured this way: all forms filled with concrete slab one day were due to be moved ahead and re-set the next.

The forms were set to coincide with line and grade stakes established on 50-foot centers, and they were sighted

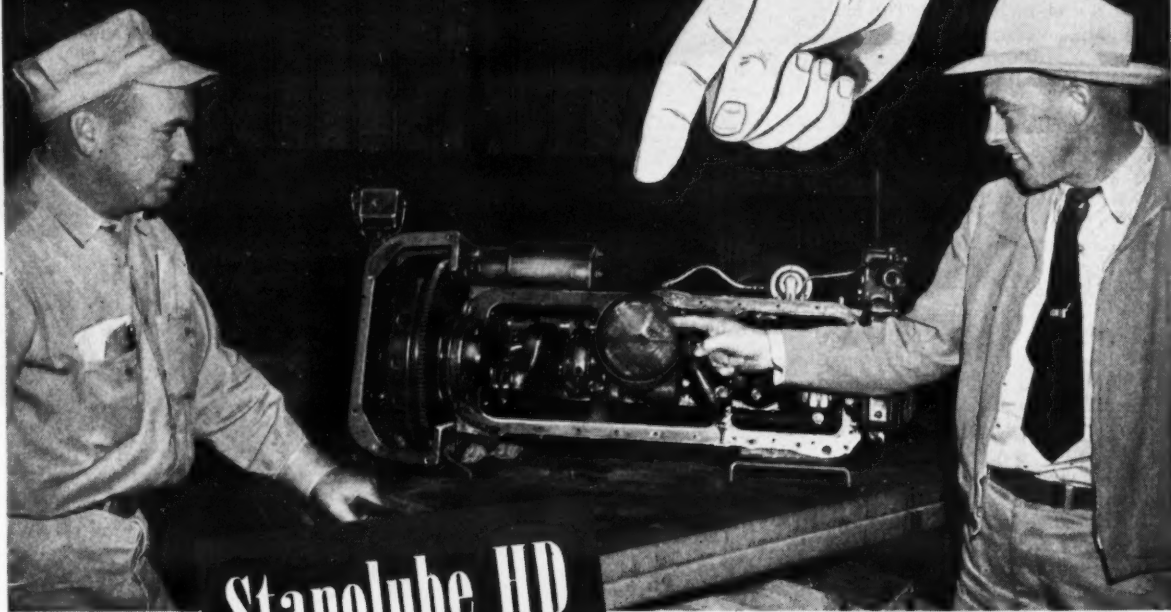


C. & E. M. Photo

A Cleveland form-pin puller extracts steel pins on the Warren-Northwest job, as men in the background load forms on a Beall low-bed trailer. All forms filled with concrete slab one day were due to be moved ahead and re-set the next.

in by eye between the survey points. A 40-man labor crew was employed to move forms ahead, set, align, and tamp them in, and to drive the pins. Not a small part of this force consisted (Continued on next page)

Stops sludge and gum on this tough job...



Stanolube HD

W. Ray Clark (left) and Buford V. Everett (right), Contractors, of Plattsburg, Missouri, examine clean oil screen and crankcase in one of the hard-worked engines in their quarrying equipment. They report that Stanolube HD ended sludge and gum trouble, reduced engine upkeep.

... gives cleaner operation in any type of fleet

Heat, dust, heavy loads, and the continuous operation of engines put any motor oil in a tough spot. Under just such conditions Stanolube HD is successfully protecting the trucks and quarrying equipment of Everett & Clark, Contractors, Plattsburg, Missouri. W. Ray Clark writes:

"We have used this oil for the past three years (in both gasoline and Diesel engines), and we have found that the upkeep on engines of all types has been greatly reduced. We have found that Stanolube HD is the one lubricant that keeps our engines free

of sludge and gum."

The same qualities of Stanolube HD that prevent sludge and gum in quarry trucks and machinery—under severest conditions—will provide clean operation in your fleet engines. You can reduce engine upkeep with this superior, heavy-duty motor oil.

A Standard Oil Automotive Engineer will help you test Stanolube HD in one of your fleet units. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

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of a fine-grading gang which smoothed the form trench for the base of the Blaw-Knox steel forms.

The form pins were driven in lightly by a sledge, and sunk the rest of the way by a Worthington W-19 rivet gun, actuated by air from a portable Schramm compressor.

A steel key form 2½ inches wide and 1 inch deep was bolted to the form along the center joint of the new highway, midway in the steel form. Round ⅝-inch dowel bars 36 inches long were also placed on 40-inch centers along this joint just below the key to support the two slabs at the joint. The free end was left outside the form by means of round holes at 40-inch centers, burned through the steel.

When the forms were all set and checked, a very light coat of the fine leveling material previously referred to was dumped inside, and smoothed out to grade by the Caterpillar motor grader. Shop-made grade guides for both ends of the blade, resting on the forms, insured that the proper depth of subgrade under the top of forms would be left. This distance was checked after the leveling course was rolled by measuring down to subgrade from a straight-edge across the form tops.

The subgrade was lightly sprinkled just ahead of the paver by a 1½-inch water hose from the paver supply, and the forms were oiled by a Lowell, Jr. 26 orchard spray, dispensing diesel fuel against the steel to keep the concrete from sticking.

Mixing and Placing Concrete

The concrete was mixed and placed at a 2½-inch slump by a Koehring 34-E dual-drum paver, spotted outside the form line. For the first traffic lane the machine operated from the south to the north end, and repeated the process in pouring the second lane.

A fleet of from 9 to 15 batch trucks, depending on the rate of pour and length of haul, was used to transport the dry batches to the paver. They drove past the paver skip and then backed in to dump one batch at a time. Putting the cement in each batch simultaneously with the sand and rock meant that the material dumped clean from the paver skip, with little more precaution than traveling occasionally with the skip up to dislodge any stuck particles.

Mixing water came from the small streams always close to the paver. A Waukesha-driven 4-inch Sterling pump raised this water to a 1,200-gallon pontoon tank on a Chevrolet truck, which supplied the paver. The truck was carried along in neutral gear behind the paver by a cable tow sling. Water was transferred from the truck to a 1,000-gallon storage tank on top of the paver by a Hercules-driven Gorman-Rupp centrifugal pump.

The concrete was mixed one minute, and deposited on the subgrade at an average slump of 2½ inches, starting at the side of the form nearest the operator. The paver was equipped with



C. & E. M. Photos

At left is the Pioneer 40-V crushing and screening plant Warren-Northwest set up to produce rock aggregates for its concrete-paving job. It was fed by a Lima Paymaster dragline. At right is the Johnson Model 164 weigh batcher brought in to proportion the aggregates, sand, and cement for the concrete mix.



a 30-foot boom, and the bucket had dual gates.

As soon as the concrete was dumped, a Blaw-Knox concrete spreader moved in, spread the mass evenly over the subgrade, and gave it an initial vibration by means of a surface tube vibrator

mounted on its stern. This machine made several trips over all parts of the pour, carrying excess material ahead with its side wings.

When it had passed, a Blaw-Knox finisher with two horizontal screeds gave the concrete surface its final dress-

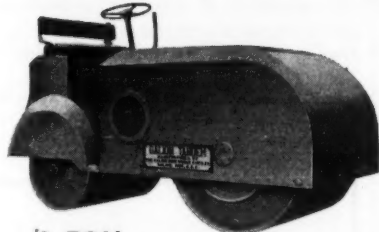
ing for compaction, and screeded the surface reasonably true to grade. Strips of asphaltic contraction-joint material ⅜ x 2 inches were set in place by cutting slots with a steel knife every 15 feet in the slab, and then setting the

(Concluded on next page)

**NO JOB TOO SMALL
NO JOB TOO LARGE**

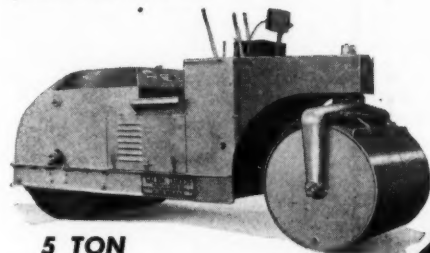
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**GALION
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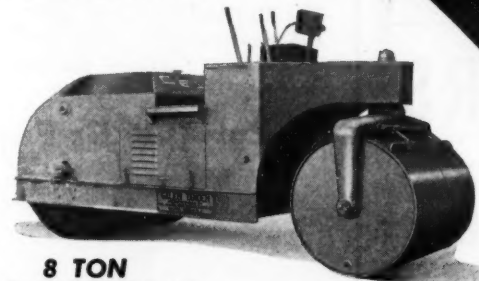
3 TON

Variable from 3 to 5 tons



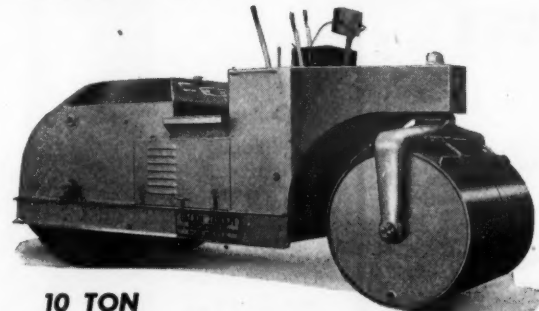
5 TON

Variable from 5 to 8 tons



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VARIABLE WEIGHT**

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C. & E. M. Photos

In the foreground of the first picture, a Johnson float finisher dresses the new concrete slab on U. S. 99E north of Albany, Oreg. Up ahead of it are Blaw-Knox spreader and finisher machines and a Koechling paver. In the second picture, workmen finish the first 12-foot lane.



Concrete Is Laid On Strategic Link

(Continued from preceding page)

mastic down $\frac{1}{4}$ inch below the surface of the concrete. After these joints were in place, the slab surface was dressed by a Johnson float finisher, with oak shoes on its various drags.

The surface of the concrete was then given a final finish with a wire broom, with the grain at right angles to the center line of the highway. The edges of the slab were dressed by $\frac{1}{2}$ -inch-radius edging tools, and when the concrete had taken on its initial hardness the surface was sealed by Hunt Process curing solution which was applied by spray.

Two Cleveland form-pin pullers were used next day to pull the steel pins, and the forms were moved ahead by loading them on a Beall low-bed trailer pulled by a GMC truck.

The best day's record up to the time the job was visited for *CONTRACTORS AND ENGINEERS MONTHLY* was 2,600 feet in an 8-hour run.

Aggregate Production

All concrete aggregates and the sub-base blanket material were produced locally on a river bar near the center of the job. The river-run alluvium was removed by a Lima Paymaster dragline, cast to a feeder hopper, and sent through a Pioneer 40-V crushing and screening plant by means of two Pioneer Model 1945 conveyors.

The sand was washed and recovered

by a Link-Belt drag washer, and four sizes of aggregate sent out from the various bins at this plant. The main Pioneer plant was altered slightly from the factory design by putting individual electric motors around the unit to drive the screens. The rest of the plant was operated by a flat-belt drive from a Murphy diesel engine. An International UD-18 driving a 50-kw generator furnished electric power.

From four to six trucks were used to haul the different sizes of material from this plant to the batch plant, about 1,000 feet away.

Batch Plant Set-Up

The batch plant for the job was set up 5.7 miles from the south end, near the center of the project. A Model 164 Johnson weigh batcher was brought in to proportion the aggregates, sand, and cement.

A Northwest crane with a 60-foot boom furnished four sizes of material to the bins of this plant. The material was pushed up within crane reach by a Caterpillar D7 with a Caterpillar bulldozer blade.

Bulk portland cement was shipped in railroad boxcars from the Beaver plant in Gold Hill, Oreg., and spotted on a siding at Jefferson, about 3 miles from the batch plant. Two 9-ton GMC transport trucks were used to transfer the bulk cement from the cars out to the plant. They dumped by gravity to a hopper, and the Johnson-plant screw feeder picked the cement up and delivered it to the storage silo. Counting the hopper, storage for about 300 barrels

of cement was possible.

Electric controls of the Johnson plant were operated from a power supply furnished by a Minneapolis-Moline-driven Westinghouse generator.

The dry batches were weighed out according to this formula, and in the following order:

Size	Pounds
Rock, $1\frac{1}{2}$ to 3-inch	1,200
Rock, $\frac{3}{4}$ to $1\frac{1}{2}$ -inch	1,200
Rock, $\frac{1}{2}$ to $\frac{3}{4}$ -inch	1,200
Sand	1,600
Cement	800

Johnson electric hopper scales were used to weigh the bulk cement, and Kron dial scales recorded the progressive weights of aggregates and sand. All material was dumped at once to the trucks as they backed in under the Johnson plant.

All rock on this project, regardless of size, consisted mostly of rounded

stream particles, and the sub-base material was the same kind. The per cent of crushed particles was small.

The batch trucks were mostly rented machines, but some company-owned trucks worked on the transfer of aggregate from the screening plant to the batch bins. Almost every make of dump truck in the book was represented. The batch trucks carried two and three batches.

Personnel

On-the-job officials for the contractor included General Superintendent R. E. Batie and Paving Superintendent R. C. Jensen. The State's Resident Engineer was A. V. Benedict. R. H. Baldock is the State Highway Engineer for Oregon, with H. G. Smith as Construction Engineer and F. D. Eason as Division Engineer.

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DO THE JOB
with
FEWER MEN



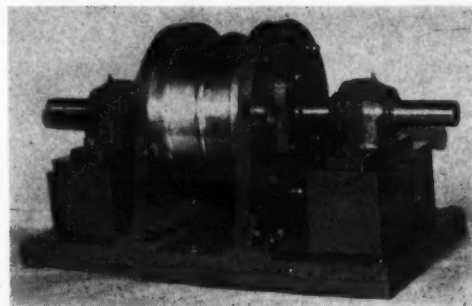
Godfrey Trough Belt Conveyor

... a man-saver and money-maker for all producers of sand, gravel, crushed stone, cinders and other abrasive materials.

Like all Godfrey Conveyors, it combines power, rigidity and strength to a degree that insures many years of continuous service life at a low operating cost.

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Elkhart 6, Ind.



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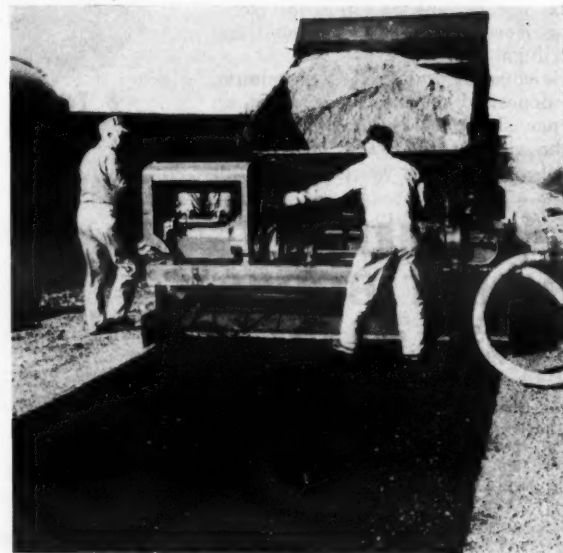
The B-14 Mill equipped with power and pumps will produce up to 3000 gallons of emulsified asphalt per hour.

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These attachments for electric hand drills are made by J. W. Whittle Co. of Chicago, Ill. A and C are saw and file attachments. B is a disk sander. And D is a screwdriver attachment.

Drill Attachments

Attachments to extend the usefulness of electric hand drills have been brought out by the J. D. Whittle Co., Small Tools Division, 208 No. Wells St., Chicago 6, Ill. Attachment A is a saw and file attachment for hand-drill use; B is a 3-inch disk sander; C is a saw and file attachment for professional use; and D serves as a screwdriver attachment.

Attachments A and C are said to convert the regular spinning motion of the drill into a forward-and-back motion for sawing and filing. Attachment B is designed as a utility device for all sanding, grinding, or polishing jobs, and is especially recommended by the manufacturer for use where larger tools cannot reach the work. Attachment D can be used with a hand drill, and will fit

most drill presses. It has a screw finder designed to help keep the screwdriver on the head of the screw. It can be used with socket bits and Phillips screwdriver bits.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 17.

New Paving Machine Lays Curb and Gutter

A machine designed to lay 5 linear feet of concrete curb and gutter per minute is announced by the Dotmar Industries, Inc., 503 Hanselman Bldg., Kalamazoo 1, Mich. This rate is said to be the normal speed of operation, which can be increased to 10 fpm if the concrete can be prepared and delivered at that speed.

The Dotmar machine uses concrete already in the forms, but has a small hopper attached for occasional addition of concrete if the forms are not full enough. The concrete used is any standard mix with the coarse aggregate graded from one inch down, and having a lower slump than that used for hand finishing.

The machine travels on top of a special movable track mounted on the two outer forms. This track is designed to fit on any standard form, and to eliminate the use of face rails and division plates. Power is provided by a 3 hp air-cooled engine. The power drive and main frame are a separate unit. Screed, strike-off, and finishing trowel may be changed in a simple operation to produce various shapes of curb and gutter. A 3-inch vertical adjustment is provided so that any thickness of gutter can be paved with the curb height re-



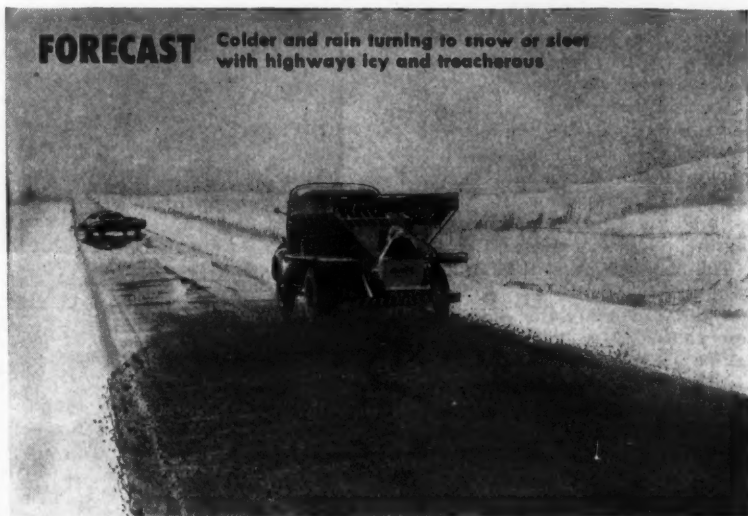
The Dotmar curb and gutter paver, traveling on a movable track which mounts on standard road forms, lays 5 to 10 linear feet a minute. The screed, strike-off, and finishing trowel can be changed to pave various shapes of curb and gutter. Any thickness of gutter can be paved, and the curb height will remain the same from the gutter level. The machine is 7 feet 9 inches long and 3 feet high.

maintaining the same from the gutter level. Further information may be secured

from the company, or by using the enclosed Request Card. Circle No. 4.

FORECAST

Colder and rain turning to snow or sleet with highways icy and treacherous



TRAFFIC MUST GO ON

THE MODEL "E" SPREADER PROVIDES DRIVING SAFETY

AT A MOMENT'S NOTICE the Highway Model "E" starts saving lives by spreading a protective coat of sand or cinders or other material on icy streets, highways, airport runways, etc. This one-man unit skid-proofs a 2 or 4 lane highway in one operation.

CHECK THESE POINTS OF SUPERIORITY

- Extra large distributor disc uniformly distributes material at all speeds.
- Spreads material on highway where needed. None wasted on shoulders.
- Spreads to right or left or to both sides while truck is operating in forward or reverse.
- Ball bearing gear boxes, oil tight, dust and water proof.
- Self unloading 24" wide conveyor assures steady material flow.
- Hopper sides hinged for easier hand loading.
- All controls operated from cab of truck.
- With optional clutch assembly spread may be started or stopped when truck is in motion.

• THE HIGHWAY MODEL "E", with adjustable baffle which directs the spread, saves time and material. Truck travels in safety because material is also cast ahead of the rear wheels of truck for traction and low to prevent interference with traffic. Material will not freeze to the sides of the sturdy wood hopper. Entire framework is made of steel, electrically welded. In sizes to fit any truck chassis. Widely used by highway departments and cities. Act now, bad weather won't wait. Write today for complete information.

Versatile—In the summer the Highway Model "E" spreads calcium chloride for dust control, sand or chips for seal coating over newly laid oil and aggregate for general road maintenance. It works the year around.

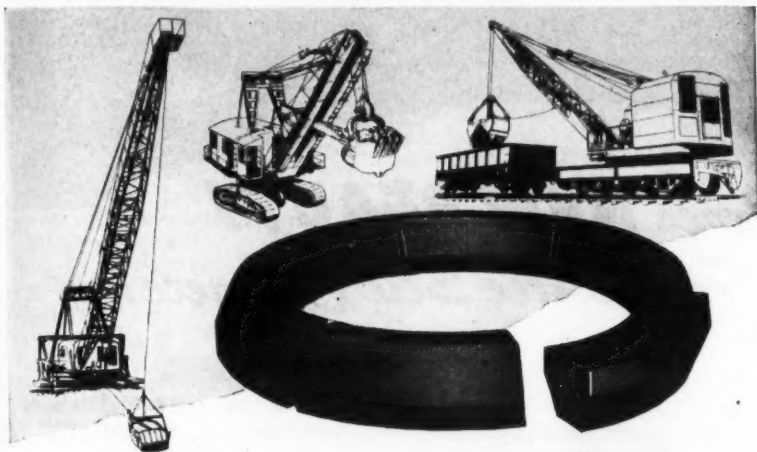
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What a difference GATKE Swing Frictions make! Tremendous Power with smooth, easy handling speeds operation and gets the job done in record time. Incredibly long wear life with fewer adjustments avoids delays and cuts upkeep costs.

You can easily get GATKE Moulded Frictions and GATKE Prescribed Brake Materials, engineered for your requirements. Once you have the GATKE Prescription, you order by number. Popular shapes and sizes are carried in stock for prompt shipment.

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CHICAGO 1, ILLINOIS

Lofty Earth Fill For Dam Finished

Completion of Earth Work At Anderson Ranch Dam Sets Stage for Storage Of Irrigation Reservoir

† THE huge earth fill which forms Anderson Ranch Dam in Idaho was completed November 16, according to the Boise office of the U. S. Bureau of Reclamation. Completion of the massive barrier makes Anderson Ranch Dam the highest of its type in the world. (See other C. & E. M. articles: Jan. 1943, pg. 2; Feb. 1943, pg. 2; March 1943, pg. 22; Oct. 1945, pg. 15; Nov. 1945, pg. 71.)

Approximately 9,000,000 cubic yards of material were placed since construction began back in August, 1941. The completed dam is 456 feet high above lowest bedrock, 1,350 feet long at the crest, 2,500 feet wide at the base, and has created a reservoir with a capacity of 500,000 acre-feet. The top of the dam is 4,206 feet above sea level.

Only a few items remain unfinished on the big project: a 330-foot-high concrete spillway, on which construction is well along; clearing remaining parts of the reservoir; completing the outlet works; building a power plant and installing the first two of three generating units. The powerhouse will have a capacity of 40,500 kw.

Plans call for full water storage in the reservoir by July, 1949, and power production early in 1950. About 140,000 acre-feet of water was stored in the reservoir last spring and summer. The entire project, except for installation of all generating units, is scheduled to be finished in 1949.

The dam will make available a much-needed supplemental supply of water for the 320,000-acre Boise project, provide more than 100,000,000 kilowatt-hours of electrical energy annually to meet growing power needs of southern Idaho, and help control floodwaters in the Boise River basin. Some years in the past they have caused considerable damage.

Eventually, when facilities for exchanging water between the Payette River basin and the Boise River basin have been finished, Anderson Ranch Dam will furnish irrigation water for a large tract of desert land under the Mountain Home Project.

All-Earth Embankment

The body of Anderson Ranch Dam is a rolled earth-fill embankment, which was zoned to produce a watertight impervious core, and supported by stable, free-draining sections. Three feet of heavy rock riprap was provided to protect the faces of the dam from weathering and wave action. Two concrete cut-off walls extend across the base of the dam and up both abutments as protection against seepage.

During the peak of activity on the project the joint-venture contracting firm of Morrison-Knudsen Co., Inc., J. F. Shea, Ford Twaits, and Winston Brothers Co. employed 1,065 men. Nine great shovels from 2½ to 5-cubic-yard capacity, fed 50 huge trucks. Twenty tractors worked at the peak of production, and ten sheepfoot rollers were required to pack the material in place.

The south fork of the Boise River was diverted past the dam during construction through a 1,500-foot-long diversion tunnel, 20 feet in diameter. The tunnel is currently being enlarged to transform it into a permanent part of the outlet works. As such, it will control the discharge of water out of the reservoir into the power turbines, and release water downriver towards the irrigation intakes.

Stops and Starts

Construction of Anderson Ranch Dam was started in August, 1941, by Morrison-Shea-Twaits-Winston. The original scheduled completion date was April 24, 1946. Despite material and labor shortages due to the war, the contractor pushed the work vigorously until December, 1942. At that time, with the structure one-third completed, the War Production Board issued a stop order to divert critically needed materials to war purposes. The stop order was modified in October, 1943, on the recommendation of the War Food Administration, which felt the project could make a sizable contribution to war food supplies if it could be completed in time. Limited construction was permitted for some time thereafter.

Man-power shortages and inability to obtain certain materials and equipment proved troublesome throughout the final construction phase. Lack of appropriations halted the work, also, for about six months during the early part of 1947.

Despite these difficulties, however, the massive Anderson Ranch bulwark is finished and ready to serve the west and the nation.

Grip Handles Aid Safety

Accidents are almost bound to happen when workers on scaffolding or in other high places lose their grip on the hand tools with which they are working and drop them. One way to prevent this type of accident is described in an announcement issued by the Miller Equipment Co., Inc., Franklin, Pa.

In this announcement, the Miller Co. points out the features of its plastic plier handles, said to improve grip, leverage, and comfort. The broadside pictures and describes the Never Slip handles, and lists the sizes in which they are made. It describes the half-smooth half-knurled design of these non-burning non-explosive handles.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 53.

Linear Ball Bearing

Ball bearings for linear or reciprocating motion have been developed by Thomson Industries, Inc., 1029 Plandome Road, Manhasset, N. Y. They are known as the Series A Ball Bushings. The bearing is a complete self-contained unit and has three basic parts in addition to the balls. According to the manufacturer, it has a low friction coefficient which provides free-rolling action without lubrication problems.

The Ball Bushing consists of a sleeve made of 52100 ball-bearing steel ground to close tolerances; a pressed-steel retainer which is fabricated in long continuous strips, cut off, and rolled up to fit inside the sleeve; and a pair of rings which are pressed in the ends of the sleeve to position and secure the retainer to the sleeve. The bearings are presently available for shafts having ¼, ½, ¾, and 1-inch diameters.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 39.



*Here's NEW BEAUTY
That Helps Me Sell Concrete!*



"Yes, Sir . . . on every trip, the new 1947 Smith-Mobile's handsome appearance helps advertise my business . . . virtually acts as my concrete salesman."

Smith-Mobile's beauty is achieved largely by functional styling. Mixer engine, transmission, water pump, valve system and all moving parts are completely enclosed in a streamlined housing. And these improved Smith-Mobiles are easy to keep handsome . . . easy to "hose off" between trips. The roomy charging chute prevents spill-

ing of dry aggregates or cement. And the perfected drum closing door seals batch in drum . . . keeps concrete from seeping out in transit.

Improved performance goes along with new beauty. Drums are larger, yet overall weight is materially decreased. Dual water injection system prevents freezing in cold weather. Direct-connected motor has 3-point suspension. Simple, lightweight transmission is foolproof. Drum rides on Timken Roller Bearings in rubber-cushioned case.

Four popular sizes. The demand for these improved Smith-Mobiles is still much greater than the supply. But deliveries are being stepped up by greatly increased production. Get the complete Smith-Mobile story — today!

THE T. L. SMITH COMPANY, 2857 N. 32nd Street, Milwaukee 10, Wisconsin, U. S. A.



New Bulletin Just Off the Press!
Gives you all the facts, dimensions and specifications of the improved SMITH-MOBILE models. If you haven't already received yours, be sure to ask for a copy.

SMITH MOBILE

The Original High Discharge Truck Mixer and Agitator

Snow Removal Speeded Through Use of Radio

(Continued from page 2)

tauqua County operates on a frequency of 31.5 megacycles. Early last year the Federal Communications Commission allocated to highway departments, for their use on maintenance, six frequencies in the 30-40 megacycle band. With these channels a number of transmitters can operate over various parts of the country without jamming or interfering with each other. Additional channels will also be made available in the 72-76 megacycle band.

Only highway matters are transmitted over the radio and brevity is always stressed. To this end the standard "10" signals of the Associated Police Communication Officials are used as much as possible, instead of a message made up wholly of words and sentences. Thus the dispatcher may speak the numbers "10-13" into the microphone. The station or truck at the other end knows that this means "Advise weather and road conditions". The numbers "10-20" stand for "What is your location?"

Sending Messages

The main transmitter station WAXK, a 250-watt unit, is controlled from county headquarters at Falconer in the southeastern part of the county. About 1½ miles away on Hough Hill, elevation 1,740, near Jamestown, is the transmitter and the 125-foot-high transmitter tower. A two-wire telephone line runs from there down to the console of the dispatcher.

Chief dispatcher Carl Button logs every call, whether incoming, outgoing, or between units. On his desk are also three trunk-line telephones, and a unit of county headquarters intercommunication system. The intercom has 10 stations and reaches into the offices, truck shed, garage, and shop; the shop unit is equipped with a loud speaker so that messages can be heard above the noise of the machines. Thus information obtained on the radio can be relayed to any one or all sections of county headquarters over the intercom.

When a unit goes out in the field the driver turns on his radio in the cab. Should he leave the car or truck, he gives the "out of service" signal to the dispatcher, and when he returns he gives the "in service" code number. Thus headquarters knows where the equipment and personnel are at all times. After each call the dispatcher announces the time and enters a record of the call into the log. During the summer the station is on the air only during daylight hours, but during the winter when a snow fight is on, the station is in use 24 hours a day. This is also true of the spring flood season in order to be ready for any emergency that may arise.

To supplement the main station, another transmitter is located at Sherman in the western part of the county. This station, WJJQ, is a 50-watt unit with a 95-foot-high sending tower. The dispatcher at each station controls the movements of the equipment working out of that particular district.

During the winter months still a third station, WNRT, is put in service at Dunkirk, a Lake Erie port. Two important highways cross the northern part of the county from east to west within a short distance of the lake. South of these routes, U. S. 20 and State Route 5, is a long paralleling chain of hills which partially blankets radio reception to the north. Hence the 50-watt station at Dunkirk enables equipment working in this heavily traveled northern section of the county to get clear reception of orders from headquarters.

Snow-Fighting Equipment

The radio-system network includes 43 mobile units which can both receive and send messages. All but 5 of these units are mounted on trucks. Four of the others are in county passenger cars used by highway supervisory personnel. The fifth is in the car of Bob Olson, radio technician, who services the radios either on the road or in the radio repair shop at county headquarters.

In the passenger cars the equipment is housed in a metal box within the trunk or luggage compartment. In the trucks a metal box containing the receiver and transmitter may be kept under the seat in the cab, suspended from the frame under the body, or fastened within the body as in the case of the smaller pick-ups. The antennae are usually fastened to the cabs.

Of the truck fleet 25 of the units range from 5 to 12-ton models, mostly Oshkosh, Autocar, International, and Brockway trucks; the remainder are lighter-weight models. In light snow,

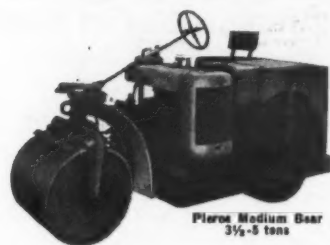
(Concluded on next page)

A Roller For Every Job

Sturdy, heavy-duty rollers, engineered to stand up under the toughest conditions. Pierce-Bear Tandem Rollers are powered by economical Allis-Chalmers 4-cylinder industrial type gasoline engines. Variable weights, from 3½ to 5 tons with built-in water tanks for ballast and wet rolling.



Pierce Baby Bear 2½-3 tons



Pierce Medium Bear 3½-5 tons

The new 2½-3-ton Pierce Baby Bear is designed for close-in work and small area maintenance. It works against a curb up to 25 inches high and within 1½ inches of a higher wall or building. Final drive is within the rear roll. Use Pierce-Bear Tandem Rollers for all-around performance. Write for folder.

Pierce-Bear Rollers
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CARE for the Hungry

In many war-devastated areas of Europe, the food shortage is still acute. Disrupted transportation, bad crops, a shortage of labor have all combined to provide only subsistence diets for millions of people already weakened by years of hunger. Rising disease rates, especially of tuberculosis, testify to the continuing need for aid. With the end of broad government feeding programs, physical rebuilding of Europe's people can still be aided by individual Americans through private organizations such as CARE, the Cooperative for American Remittances to Europe, Inc.

CARE is a non-profit, government-approved food package service to Austria, Belgium, Czechoslovakia, France, Finland, Greece, Hungary, Italy, Norway, the Netherlands, Poland, Rumania, the American, British and French zones of Germany plus all of Berlin. It is composed of twenty-seven major welfare agencies concerned with sending aid to Europe. It has been termed by General Eisenhower, a "personal expression of international goodwill."

The CARE food package contains more than twenty-one pounds of meat, fats, sugar, milk, flour, chocolate, coffee and other essential foods which are practically unobtainable in Europe today. Operating through agreements with the European governments, CARE guarantees delivery of its parcels ration-free, duty-free, tax-free.

Total cost of a CARE food package is \$10. Orders are airmailed to the designated countries in Europe and delivery is made from local European warehouses. Individuals and organizations can send CARE food packages to friends and relatives in Europe. Orders may be sent to **CARE headquarters, 50 Broad Street, New York 4, N.Y.**

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- No. 2 — Ideal for general oil type lubrication, ring oiled bearings, wick feeds, sight feeds and bottle oilers.
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- BALL BEARING — This is the LUBRIPLATE Lubricant that has achieved wide acclaim for use in the general use of ball and roller bearings operating at speeds to 5000 RPM and temperatures up to 300 degrees F.



LUBRIPLATE
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NEWARK, N. J. CLEVELAND, OHIO

DEALERS FROM COAST TO COAST
CONSULT YOUR CLASSIFIED TELEPHONE BOOK

Snow Removal Speeded Through Use of Radio

(Continued from preceding page)

Ross one-way plows are attached to the trucks. If the snow gets heavier, Frink or Ross V-type plows are then put on. The County also has 3 Snogo rotary plows mounted on Oshkosh 4-wheel-drive trucks driven by Cummins 150-hp diesel engines. Of this number, 8 truck plows and a Snogo are usually kept at the Sherman district headquarters, while the others are at Falconer.

The main station at Falconer is kept informed of future weather conditions by forecasts from the airports at Buffalo and Dunkirk. The chief dispatcher also has contacts with local police headquarters throughout the county, and with all-night gas stations which inform him of the beginning of a snowfall. Plows are then sent out when needed from the nearest district headquarters.

During the height of the snow season, some plows are kept in garages located south of the main ridge of hills in the northern part of the county. The garages are near the homes of the operators, and a phone call from the dispatcher will usually get them out on the road in 15 minutes. This is done so that work can begin on the two main east-west highways without delay.

As soon as a plow is in service, the operator informs the dispatcher of the snow condition as he finds it, including any information on winds, drifting snow, rate of fall, etc. These data are supplemented by reports from supervisory personnel or foremen who cruise the roads either in passenger cars or pick-ups to observe the extent of the storm. The dispatcher then sends out calls for extra equipment as needed.

As each truck goes into service, the dispatcher sticks a flat-headed pin into a large county map that hangs before him. On the head of the pin is the number of the unit and an arrow which is kept pointing in the direction the truck is plowing. The position of the pin on the road is constantly changed as the radio report of its location reaches the office. Thus one can tell at a glance how much equipment is out, where each unit is located, and the direction in which it is going.

In this way trucks can easily be shifted about as conditions warrant, according to the reports which are re-



Chautauque County Highway Dept. Photo

A Snogo opens up Route 17 in Chautauque County, between Mayville and Westfield.

ceived, or they can be sent to a spot where an emergency may have arisen. Local residents or motorists can also tell the truck drivers of situations where help is needed, and the driver can inform the dispatcher. The dispatcher, in turn, can summon assistance quickly over the radio, eliminating all lost motion and thereby preventing accidents or possible loss of life. This is of particular benefit when an icy condition develops on a road.

Ice Control

For icy roads the County uses both cinders and sand. These materials are stockpiled at headquarters and treated with rock salt to prevent freezing. For every cubic yard of sand 400 pounds of rock salt is added, while 100 pounds suffices for a yard of cinders. Other stockpiles of abrasives are located around the county at strategic locations. Trucks are loaded at the piles by any one of the three county-owned shovels, or by bucket loader, or by shovels rented from the towns. Additional trucks may be hired as necessary.

The abrasives are applied to the icy roads by New Leader lime spreaders, which the Highway Department has found to be well suited for spreading either cinders or sand. Ten of these units are available—four are kept in Sherman and six in Falconer.

In both snow and ice work, the trucks are usually manned by a crew of 2 which works a 12-hour shift when 24-hour-a-day plowing is required. At the peak of the winter season 150 men

are employed on snow removal. To these regular county employees extra help is added when necessary.

In the big storm that Chautauque County experienced during March, 1947, high winds whipped drifts 7 feet high across the highways. These were removed methodically with the Snogos breaking through first, followed by the large V-type plows. Whenever the next big storm comes, the Highway Department is prepared to meet it, with the full weight of adequate equipment intelligently directed and handled through its two-way radio system. County officials hope that they will not have another storm like that of last winter which kept all plows and sanders working 8 consecutive days without a break. If necessary, however, all units will be out and the roads will be kept open.

W. Bruce Chilson is County Superintendent of Highways with headquarters at Falconer. He holds the office of President of the County Highway Officials' Division of the American Road Builders' Association. District Superintendent Harry Fenton handles the Sherman district in the western part of Chautauque County, and Sibley (Sib) Torry, Mr. Chilson's assistant, works the main district out of Falconer.

Dowel-Beam Assemblies

A descriptive folder on its line of dowel-beam assemblies has been prepared by Arthur H. Harris, 1283 East St., New Britain, Conn. The cover shows a picture of Stewart Field, United States Military Academy, Newburgh, N. Y., on which the Harris dowel-beam assemblies were used. And the rear page shows a stretch of the Merritt Parkway in Connecticut, on which Harris armored dowel-beam units were used.

The catalog lists seven features of the Harris products. It also contains a cross-sectional drawing of the dowel-beam and the armored dowel-beam assemblies in place.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 91.

Zino Joins Swan-Finch Co.

The appointment of Anthony J. Zino, Jr., as Assistant Sales Manager of the Industrial Sales Division has been announced by the Swan-Finch Oil Corp., New York. Mr. Zino will make his headquarters in the home offices of the company, located in the R.C.A. Building.

1500 WATT PORTABLE

**"U.S." BUILDS THE RIGHT
ELECTRIC PLANT
FOR YOUR NEEDS!**

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"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 140 KW—for stand-by, continuous duty, battery-charging, and portable uses. Skids, rings, porter bars, and trailer mountings available. Write for literature, stating type of unit and capacity required.

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MODEL 400
LOADER**

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around quarries, stock piles and road building jobs.

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Contractors and Engineers Monthly - Red Request Card - Jan. '48

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31	32	33	34	35	36	37	38	39	40	81	82	83	84	85	86	87	88	89	90
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The new Alabama Minute Maps show a driver where he is, how far he has come from the last major town, how far it is to the next, and how long it will take to get there by traveling at the speed recommended. It is believed that such specific information will enable him to drive more confidently and safely.

New Highway Marker Gives Specific Data

"We want you to live" is the slogan of a new safety campaign begun by the Highway Department of the State of Alabama. Taking what it calls the "psychological approach" to improving highway safety, it has introduced a new road-marking system, which is said to be proving successful. The new "Minute Maps", as they are called, incorporate information which the State believes will make it possible for every driver to drive more confidently, with specific and exact knowledge of highway conditions ahead.

The maps show the driver where he is, how far he has come from the last major town on his route, how far the next town is, and the time it will take him to reach it by driving at the speed recommended on the sign. Authorities claim that these Minute Maps do not add more markers to highways; that they actually result in a reduction in the total by consolidation of certain necessary markers.

In introducing the new markers, Alabama notes that the members of its Highway Patrol have driven more than 47,000,000 miles in the past 12 years without a fatality—and such patrolmen must often drive at high speed under adverse conditions. The State contends that the reason these men have such a safety record is that they have already gained that "specific and exact" knowledge of highway conditions and safe speeds which the new markers seek to impart. In theory, the driver heeding the Minute Maps is in the same position as a driver being personally escorted over the route at a safe speed by a police officer.

Alabama authorities report that traffic checks have shown that "a more even and orderly flow of traffic" has been promoted by the markers, and that the average motorist was influenced to travel within the speed stipulated by them. "Fast drivers were slowed down, and slow drivers speeded up. The latter is highly desirable since they are contributing factors to a considerable number of accidents." The Alabama experiment is being watched with interest by traffic and safety engineers.

Fire-Fighting Equipment

A catalog showing its complete line of fire-fighting equipment has been put out by The Fyr-Fyter Co., 1904 Fyr-Fyter Bldg., Dayton 1, Ohio. This catalog, No. F-260, begins with a description of the Model A hand-size extinguisher, and continues through the wheel-mounted No. 73. Also described is the Fyr-Fyter line of refills, etc.

In describing Model A, the catalog shows a picture of the unit, lists nine features claimed for it by the manufacturer, shows a cross-sectional view of

the extinguisher, and lists its 24 parts. In much the same way, it covers all the extinguishers which The Fyr-Fyter Co. makes. The line includes both soda-acid and foam-type extinguishers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 99.

Resort Road Widened

A narrow mountain trail which connects the Dartmouth Outing Club's Moosilauke Ravine Camp in Warren, N. H., with State Route 118 has been enlarged. It was widened for the winter skiing season to a 20 to 30-foot road. The extra width added to the old trail will provide parking space for the cars of guests at the camp.

An International-Harvester tractor equipped with a Bucyrus-Erie 12-foot dozer blade enlarged the side-hill trail by cutting into the bank on one side of the road and pushing the material off on the other. Its tilting blade was later used to cut a ditch on the hill-side cut



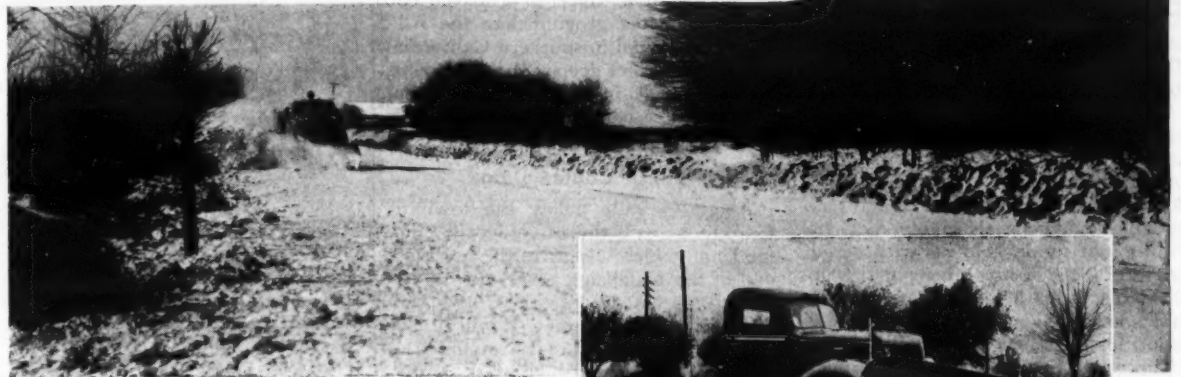
C. & E. M. Photo

Operator Emilio Luongo widens a resort road in New Hampshire with the Bucyrus-Erie 12-foot blade on his International TD-18 tractor. Mt. Moosilauke, 4,810-foot elevation, is seen in the background.

of the roadbed for drainage purposes. A gravel sub-base was spread over the soft, wet, silty soil, which is liberally

studded with boulders. The work was done by Landers & Griffin, contractor of Portsmouth, N. H.

For Late Winter Snows—

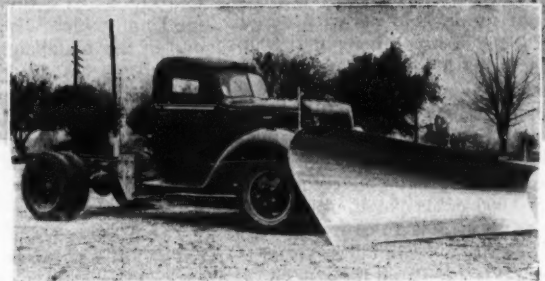


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Insert shows Gledhill standard, one-way 10' plow. Spring-type flareboard does this:

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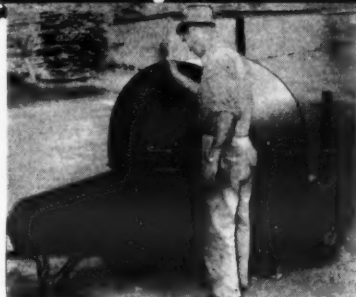
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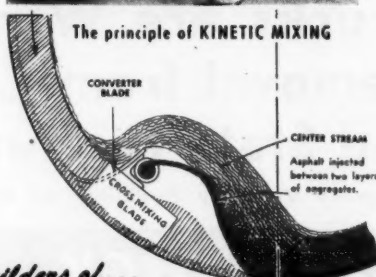
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Look at this mixing principle. See how the converter blade peels off the material and cross mixing blades fold the material in under. Note too that the asphalt is injected in *between* the two streams.

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Also See Page 69

THE FOOTE COMPANY, INC.
1916 State Street, Nunda, N. Y.

the FOOTE
Kinetic
mixer

Contractors Speed Irrigation Project

(Continued from page 6)

- a. A canal 1.8 miles long, skirting Coulee City.
- b. A 1,000-foot concrete siphon across Bacon Coulee, south of Coulee City.
- c. A 10,000-foot tunnel through a lava ridge.
- d. Trail Lake, 2.4 miles long.
- e. A canal 1.7 miles long, utilizing a natural channel.
- f. A 165-foot waterfall into Long Lake.
- g. Long Lake Power Plant, construction of which is tentatively deferred.
- h. Long Lake, formed by a dam at the lower end of Long Lake Coulee, just north of Stratford, Wash.
- i. A lined canal 6.6 miles long.
5. East High Canal, construction temporarily deferred.
6. East Low Canal, 130 miles long.
7. West Canal, 78 miles long.
8. Potholes Dam, 3½ miles long, and Potholes Reservoir.
9. Potholes East Canal, 60 miles long.
10. Potholes West Canal, 22 miles long.
11. Pasco Pumping Plant and laterals.
12. Burbank Pumping Plant and laterals.
13. Lateral systems under each to the above canals.

The distribution system to spread the water out over the land will require construction of four earth-fill dams, totaling nearly 6 miles in length, with 15,500,000 cubic yards of earth and rock embankment materials involved. There will be four tunnel projects with a total length of 7 miles, involving about 500,000 cubic yards of excavation, 100,000 cubic yards of concrete lining, and great quantities of timber and steel.

There will be 46 siphon projects with a total length of 28 miles. To prepare a bed for these great concrete pipes, about 1,500,000 cubic yards of excavation will be necessary. Pouring the barrels will require 300,000 cubic yards of concrete to be mixed, and the structural and reinforcing steel will total 170,000,000 pounds.

Nine principal canal projects will be built, totaling nearly 500 miles in length and involving 41,000,000 cubic yards of earth excavation, 14,500,000 yards of rock removal, 7,500,000 yards of rolled embankment, and 2,000,000 yards of concrete.

Pumping Plant Begins System

The distribution system will begin with the Grand Coulee Dam Pumping Plant, a piece of mechanical engineering in keeping with the magnitude of the project.

The pumping plant, dependent upon power generated at Grand Coulee Dam, will carry on where the dam leaves off in raising the Columbia River water out of its deep canyon to the dry lands to the south. The dam raised the river level 350 feet. The pumping plant normally will boost river water 280 feet higher. Then, at an elevation 630 feet above the river, water will flow by gravity down the Grand Coulee towards the lands to be irrigated.

The base for the pumping plant, including a 600-foot wing dam, trash-racks, and intake structures, was built with Coulee Dam. The foundation rests on a shelf dug in the west wall of the canyon, adjoining the upstream face of the main dam.

The most powerful pumps ever made will be installed. Each unit will consist of a vertical-shaft centrifugal pump, direct-connected to a 65,000-hp synchronous electric motor. Each motor-pump installation will be about 50 feet high. Plans call for a dozen of these units, two of which will serve in reserve. The pump units will be operated in pairs, each pair to be supplied

with power by one of the 150,000-hp generating units in the adjacent west powerhouse, just below Grand Coulee Dam.

The Pelton Water Wheel Co. and the Byron Jackson Co. of San Francisco are building the first six pumps for \$1,062,975. Each pump will deliver a maximum of 720,000 gpm, sufficient for 100,000 acres of land. They are capable of throwing twelve times as much water as any previously built, according to the manufacturers.

The first six electric motors are being built by the Westinghouse Electric Corp. and the General Electric Co., under contracts totaling \$2,527,032.

Each pump will discharge through a steel pipe 12 feet in diameter and about 680 feet long. Twelve tunnels, from 487 to 530 feet in length, will carry the pipes up through the granite canyon wall. Upon emerging from the tunnels, the pipes will continue on concrete piers for 260 feet, and discharge into the headworks of the feeder canal.

Feeder Canal

The feeder canal will run 1.6 miles southwest from the pumping plant to the North Coulee Dam, and will discharge into the equalizing reservoir. This canal will be the biggest in the system, with a capacity of 16,000 cfs, 845 second-feet greater than the All-American Canal in southern California. It will be 25 feet deep, 125 feet wide at the top, and 50 feet wide at the bottom.

The feeder canal will be lined with concrete.

North Coulee Dam

About ½ mile below the town of Grand Coulee is the site of North Coulee Dam, which will form the northern end of the equalizing reservoir. It will stretch across the Grand Coulee for approximately 1,400 feet. It will be 115 feet high, of earth-fill construction. The face will be covered by riprap to prevent water and wind erosion.

Equalizing Reservoir

The 27-mile equalizing reservoir will have an active storage capacity of 700,000 acre-feet. Water will cover most of the floor of Upper Grand Coulee, causing the Government railroad to be abandoned and a state highway to be relocated. Steamboat Rock, famed landmark, will be an island.

Creation of the reservoir will cost less than 27 miles of concrete-lined

canal. It will permit an adjustable pumping schedule to meet varying demands for irrigation water and electrical energy; thus maximum advantage can be taken of secondary and off-peak power by diverting power from pumping duty to domestic, municipal, and commercial uses during peak demands. This will reduce pumping costs.

South Coulee Dam

An earth-fill dam extending west from the outskirts of Coulee City,

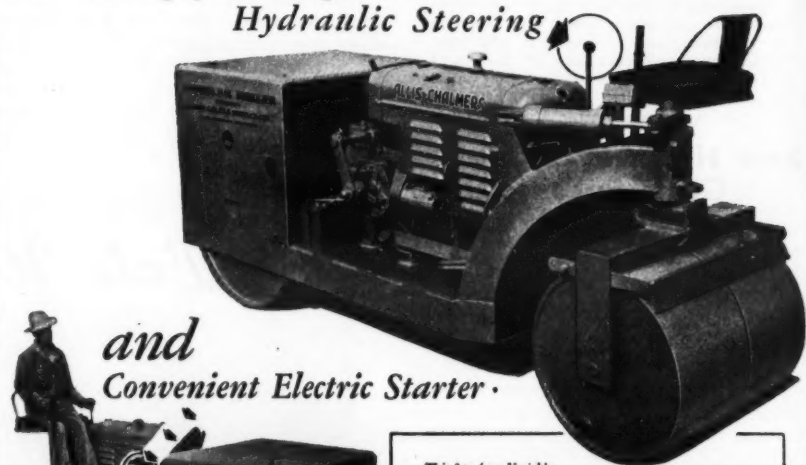
Wash., will form the southern end of the equalizing reservoir. Named the South Coulee Dam, it will back water 27 miles up the coulee to the North Coulee Dam.

Nearly 10,000 feet long with a 450-foot base and 65 feet high, this dam has been started by the Spokane firms of Roy L. Bair and James Crick & Sons, at a contract price of \$2,771,887.50. Water will flow through the dam's six 12 x 18-foot outlet conduits to the Main

(Continued on next page)

WHEELER Tandem Rollers

Bring you Single-Lever Hydraulic Steering



and Convenient Electric Starter.

This 3 to 4 ton Variable Weight roller is popular on the job. Its convenient features include the single-lever clutch, the foot operated parking brake and easier maneuverability.

Wheeler Tandem Roller's single lever, hydraulic steering and electric starter can improve your on the job efficiency. The Hydraulic steering is engine powered. Operating by finger tip control, the steering knob moves to right or left, leaving the operator free to devote full attention to the rolling job at hand. Turning and maneuvering is greatly simplified; the square footage rolled per day can be increased. This single steering knob is the only control needed to slowly or quickly turn a Wheeler Roller in any direction. Convenience means faster operation.

ELECTRIC STARTER AIDS OPERATION

The electric starter, now offered with the Wheeler Roller, simplifies starting and stopping. Idle running time is reduced and waste of fuel is minimized. Well within the operator's reach, the starter reduces the operator's labor and operating time.

NEW DEALERS are being added—Choice territories are still available

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SPECIFICATIONS
POWER: Allis-Chalmers Industrial Model B.
24.5 Brake Horsepower @ 1500 RPM.
27.8 Brake Horsepower @ 1800 RPM.
Speeds 2 forward and 2 reverse give 1.55 to 4 MPH range in either direction.
DIMENSIONS: Wheel Base 7' 10"; length overall 10' 7"; width overall 3' 6". Tank height 4' 10". Ground clearance .10" Left side clearance 1½".
WEIGHTS: Shipping weight (approximately) 5500 lbs. Maximum weight (with ballast) 8000 lbs. Extra metal weight 400 lbs.
COMPRESSION Per Lineal Inch: Compression roller, 150 lbs. with ballast. Steering roller 70 lbs. with ballast.
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Main Canal, Northern Section

The Main Canal will carry irrigation water from South Coulee Dam to the headworks of East Low Canal and West Canal near Adrian, Wash. Its length, including Bacon Siphon, Bacon Tunnel, Trail Lake and Long Lake sections, will be about 20 miles.

The northern section of the Main Canal, that part above Long Lake, will be 7.7 miles long, including the siphon, tunnel, and Trail Lake. J. A. Terteling & Sons, of Boise, is constructing this section, excluding Bacon Siphon and Tunnel, under a \$1,548,060 contract. It will have an ultimate capacity of 13,200 cfs, sufficient to irrigate 1,029,000 acres. A second siphon and tunnel will be built in the future when sufficient irrigation is under way to require them.

The northern section will end on the rim rock above Long Lake Coulee, where canal water will plunge 165 feet into Long Lake. Under long-range plans, East High Canal would take off just above the fall, and a power plant would be built below it to generate electricity for pumping water to project lands lying above the canals. The canal would have an initial capacity of 3,070 cfs, and would extend 110 miles south to a point east of Connell, Wash.

Bacon Siphon

About 2 miles south of Coulee City, a deep coulee cuts across the main canal's line of march. Irrigation water will cross the coulee in the Bacon Siphon, a circular tube of reinforced concrete 1,000 feet long, 23 feet 3 inches in diameter, with a shell thickness of 23 inches.

Bacon Tunnel

After crossing the coulee, the siphon will end in the Bacon Tunnel, about halfway up the south wall of the coulee. The tunnel will extend 10,000 feet through a lava ridge and emerge in Trail Lake Coulee. It will have a rough diameter of nearly 27 feet and a finished diameter of 23 feet 3 inches when lined with concrete. Both the tunnel and the siphon are in progress under a \$3,394,000 contract with T. E. Connolly Co. of San Francisco.

Long Lake Dam

Long Lake Dam, 2 miles north of Stratford, is part of the main canal. Unlike the project's other earth-fill dams, it is not a storage structure. Its purpose is to save 5½ miles of difficult and costly canal construction by blocking a canyon and turning into a waterway the canyon now occupied by three small lakes.

The dam will be 1,900 feet long, 130 feet high from bedrock, and 600 feet wide at the bottom. A rock-cut channel 1,300 feet long and 150 feet wide, cut around the east abutment, will serve as an emergency spillway. A concrete outlet tunnel 7½ feet in diameter will run through the left abutment, and permit draining of the reservoir. The contractor for this is also J. A. Terteling & Sons of Boise, at a contract price of \$1,770,592.00.

At the head of the lake thus im-

pounded will be the 165-foot waterfall from the main canal, pouring over the cliff into the lake. Geologists say that this will re-create a waterfall which disappeared at the close of the Ice Age, some 20,000 years ago.

Main Canal, Southern Section

After flowing through Long Lake, ir-

rigation water will enter the southern and final section of Main Canal, at the west end of Long Lake Dam. The main canal runs southwest 6.6 miles to the bifurcation works at the heads of East Low Canal and the West Canal.

The southern section of Main Canal has a capacity of 9,700 cfs, sufficient for 800,000 acres. It is 120.5 feet wide at

the water surface, 50 feet wide on the bottom, and the water depth will be nearly 21 feet. Work on this canal marked the start of work on the project distribution system. Morrison-Knudsen Co., Inc., finished the first \$619,000 contract this June, a year after starting and a year ahead of schedule.

(Continued on next page)

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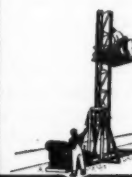
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The skip platform is 6' x 6'; holds two wheelbarrows; lifts 2500 lbs. For jobs higher than 40 feet, two 10' tower extensions can be added.

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Contractors Speed Irrigation Project

(Continued from preceding page)

West Canal

West Canal will be 78 miles long, and will serve 281,000 acres in the western part of the project. It will wind near the northern and western boundaries of the project for about 50 miles. A 9,150-foot tunnel will carry it through the Frenchman Hills to the Royal Slope, where it will branch to the east and west.

Work on this is now under way by Utah Construction Co. and Winston Bros. Co. (see companion article on page 6). The canal section will vary from 87 to 107 feet in width at the water surface, and will have a capacity of 5,100 cubic feet per second.

The most striking feature of the West Canal will be the Soap Lake Siphon, which will carry the water across the Lower Grand Coulee. This pipe line will be 12,000 feet long and 23 feet in diameter. A portion at each end will be of concrete, but across the coulee floor a steel pipe will be required because of the great head and resulting high pressure.

East Low Canal

East Low Canal will be 130 miles long, and will carry sufficient water to irrigate 252,000 acres. From the division works of the Main Canal, the East Low Canal will extend southeast the length of the project, terminating in the Snake River Valley, 8 miles northeast of Pasco, Wash. The first 12.3-mile section of this canal is now under contract to Utah Construction Co. and Winston Bros. Co.

Potholes Dam

Potholes Dam, near the center of the project, will be the largest of four earth-fill dams in the irrigation system, and the fourth longest dam in the United States.

It will extend 3½ miles in an irregular east-west course, and will have a maximum height of 207 feet above bed-rock. Its volume of 9,190,000 cubic yards will be nearly as great as that of Grand Coulee Dam. The work on Potholes Dam has recently begun under a \$9,359,011 contract with the C. F. Lytle Construction Co. of Sioux City, Green Construction Co. of Des Moines, and Amis Construction Co. of Okla-

homa City.

The dam will seal off the Crab Creek channel, and other channels at the east end of Frenchman Hills. Geologists believe these channels were cut by the same Ice Age floodwaters that carved the famous Grand Coulee when the cordilleran icecap blocked the Columbia River gorge at the site of the Grand Coulee Dam.

The reservoir, with a capacity of 615,000 acre-feet, will store water draining from lands in the northern part of the project for re-use on about 270,000 acres in the southwestern part. Recapture of thousands of acre-feet per year is anticipated when the project is fully developed. This will reduce by an equivalent amount the quantity to be pumped at the Grand Coulee Dam, and consequently, a reduction in pumping cost will result. This is one of the brilliant tricks designed by the engineers of the Bureau of Reclamation.

The Potholes Reservoir will also receive water from the East Low and West Canals through wasteways.

Two canals will be served by the Potholes Reservoir. The Potholes East Canal will extend to the south and east almost to Pasco, and will serve 254,000 acres. A branch will extend west to water Wahluke Slope, on the south side of the Saddle Mountains. The Potholes West Canal will serve 13,600 acres along the base of the Royal Slope, on the south side of the Frenchman Hills.

Pasco Pumping Plant and Laterals

A pumping plant and a lateral system to serve 5,361 acres in Irrigation Block No. 1 is nearing completion 12 miles northwest of Pasco, Wash. The lateral system will eventually be fed by the Potholes East Canal, and the pumping plant will be salvaged.

The pumping plant, on the east bank of the Columbia River, will lift 126 cfs of water 167 feet. A steel pipe 60 inches in diameter will carry the water up the bank to the headworks of the main lateral. A contract for the pumping plants was awarded to James Construction Co. of Seattle for \$188,537.68.

Laterals and wasteways will total about 23 miles in length. Concrete, asphalt, and pneumatically applied mortar are being tested as linings for the laterals. Seven relief pumps will be installed along the distribution system to force water to higher elevations. J. A. Terteling & Sons is building the laterals at a contract price of \$714,-

223.00.

Another pumping plant, on the south bank of the Snake River a few miles east of Pasco, is planned, with a lateral system to serve about 4,500 acres at the southern tip of the project. The Burbank Unit, as it is called, will be developed in three blocks. There will also be several demonstration farms in as many different parts of the huge project to study crop techniques and the techniques of applying irrigation water.

Project Is Vast Undertaking

Development of this huge undertak-

ing will take many another long and arduous year, and as the contracts are let, CONTRACTORS AND ENGINEERS MONTHLY will report the unusual or outstanding jobs as they occur.

Michael W. Straus is Commissioner of Reclamation; Walker R. Young is the Chief Engineer; R. J. Newell is Regional Director. And with them on the roster are the names of a legion of men who studied, who investigated and dreamed this thing through, who climbed around through the coulees and rim rock, who fought summer heat and winter cold common to the region.

(Concluded on next page)

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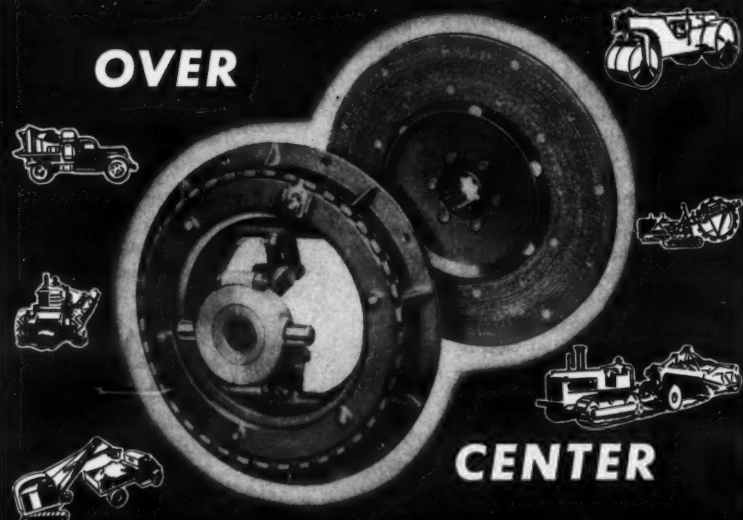
crack, crumble, curl or loosen. Also patches concrete to a perfect feather edge. Heavy loads on steel wheels actually improve it. Five-year-old floors show no wear. Used by largest railroads and industries in America. Over 600 contractors have found Plastic Rock a good-will builder and profit source. No special equipment needed. Not for home use.

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Farmers will buy the land and pay another \$10 to \$45 an acre to get it ready for water. Expert advice will be available for the settlers, if they wish to use it, on how best to lay out their new farms and how best to get started in a crop and livestock program. The agricultural Extension Service of the State College of Washington will take the lead in this program of advice and assistance, with the close cooperation of the Bureau of Reclamation.

The Bureau, through the three irrigation districts organized by the land owners in the project, will be responsible for collecting an average of \$85 per acre in construction charges and the annual charges for operation and maintenance. The construction charges will be paid off in 50 years, including an initial 10-year moratorium. Although the payment of these charges and the hewing of new farms out of raw land will not be easy, in the end the project will add up to a dream come true.

Revision of Airport Grant Rules Asked

The Civil Aeronautics Administration has been asked to revise current procedure in offering grants and awarding contracts for airport construction under the Federal Airport Act of 1946. The request was made in the form of a resolution passed by the Joint Cooperative Committee of the National Association of State Aviation Officials and The Associated General Contractors of America. The committee meeting was held in conjunction with the annual convention of the NASAO at Fort Worth, Texas.

The present rules do not permit an increase in the amount of a bid grant once it has been approved. Contractors pointed out that when the cost of a project, as evidenced by bids, is higher than anticipated at the time the original grant offer was set, the alternatives have been to reject bids, or to put through another grant offer with consequent delays.

The alternative plan requested by the Joint Committee is that a grant be awarded on the basis of the estimated prices shown, and then—within the limits of the CAA's financial ability—that this grant offer be subject to revision in accordance with the bids received. In this connection, the regulations require the acceptance of the grant offer within 60 days of the time the CAA sends it to the sponsor. It follows, therefore, that the advertising and receipt of bids must be scheduled so that the CAA will have an opportunity to send out a revised grant offer within the time allowed.

It was also brought out at the meeting that one of the principal factors currently holding back the airport program is the lack of engineering plans and specifications. Problems involved include persuading local public engi-

neers to expedite airport plans in the face of other work for which they are responsible; and the time involved in educating private engineers engaged in this work.

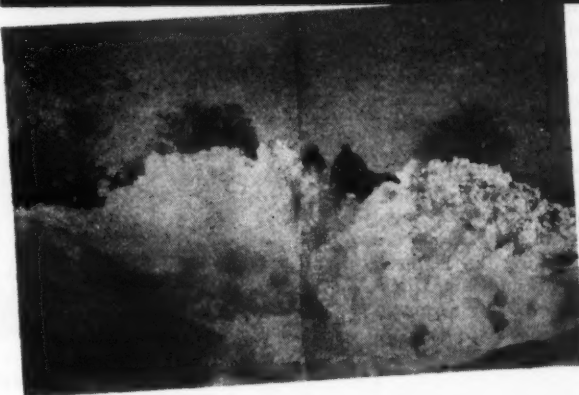
The purpose of the Joint Committee is to study ways and means of expediting the construction of needed airports

so as to provide the maximum in airport facilities for the airport dollar. It is felt that this study is especially needed in airport construction. For there are many problems without precedent whose solution calls for understanding and cooperation both on the part of the engineers and officials who

administer the preparation of plans and the award of contracts, and the contractors who actually execute the construction.

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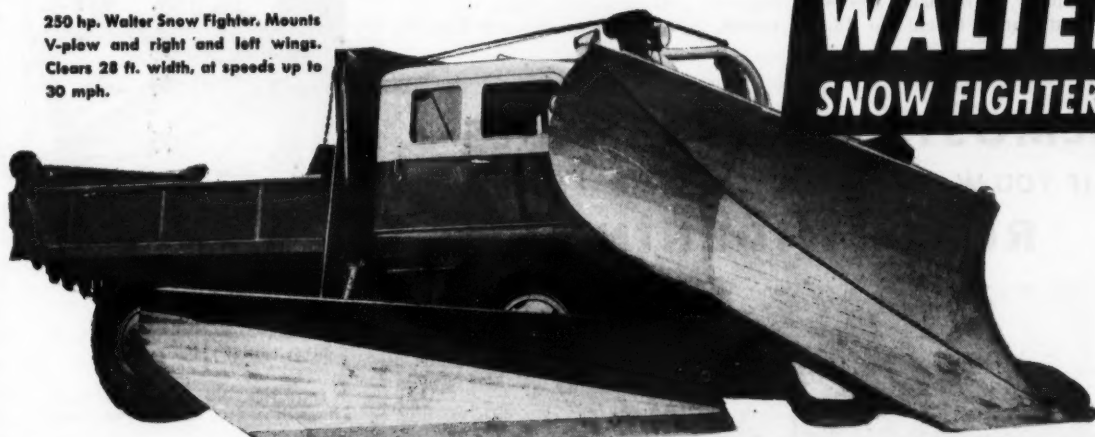
HIGHWAY departments equipped with Walter Snow Fighters, usually make these powerful units their key equipment. Wherever vital highways must be opened fast, and kept open—where the toughest stretches exist—where drift-choked roads stop all other equipment, there you will find Walter Snow Fighters spearheading the attack.

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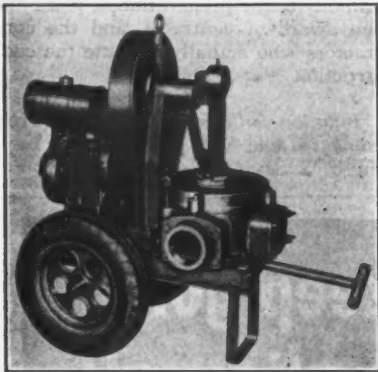
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The new Carver 3 and 4-inch diaphragm pumps range in capacity from 1,000 to 6,000 gph. The manufacturer recommends them for suction lifts up to 20 feet, and for use with fluids having a solid content up to 25 per cent.

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Diaphragm pumps featuring strength and durability are included among the products of The Carver Pump Co., 1056 Hershey Ave., Muscatine, Iowa. It is said that these features make the pumps applicable for use with sludge, mud, seepage, grit, sewage, slime, and other fluids having a content of solid material up to 25 per cent. The Carver diaphragm pump is recommended by the manufacturer for suction lifts up to 20 feet; its maximum lift is 25 feet.

Two new pumps in 3 and 4-inch sizes have been made available by the company. The capacity of these pumps is said to range from 1,000 to 6,000 gph. They are designed with a live-rubber diaphragm as the only moving part exposed to gritty water; the diaphragm is said to be easily replaced as this becomes necessary.

Anti-friction Timken roller bearings are used on the pump rod and in the main transmission. Other features claimed include accessibility of the non-clogging valves for inspection or removal; a completely enclosed transmission; large water passage for free flow; and an accessible clean-out hand hole.

Carver pumps are available with gasoline engine, electric motor, or without a power source. They can be furnished on a two-wheel truck mounting with rubber tires or steel wheels, or skid-mounted.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 18.

Book Covers Choice Of Structural Design

A new book, "Architectural Construction", has been published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. It is concerned with the structural system and structural elements of a building, such as a suitable building frame, foundation, floor, roof, and wall. It was written by Theodore Crane, C.E., M.A., Consulting Engineer, and Professor of Architectural Engineering at Yale University.

The book deals with the problem of making an appropriate choice for the structural portions of a building, as governed by the geographical location, site conditions, type of occupancy, equipment, and architectural design. It is written for students in architecture, architectural engineering, and building construction, and for practicing architects and architectural engineers who desire a resumé of types of construction now available, with recommendations concerning their specific applications.

Chapter titles are: Building Codes and Design Standards; Choosing the Framing Material; Planning the Framing of a Building; Choosing the Structural Floor System; Choosing the Structural Roof System; Wide-Span Designs; Choosing the Wall Assembly; Masonry Walls; and Choosing the Type of Foundation.

The book can be obtained from the publisher or at most book stores. It contains 414 pages and sells for \$6.00 a copy.

How to Operate and Care For High-Pressure Boilers

A highly informative booklet on the operation and care of power boilers has been issued by the Kewanee Boiler Corp., Q Road, Kewanee, Ill. This 16-page booklet, punched for insertion in a looseleaf notebook, covers all phases of boiler installation, operation, and maintenance.

The booklet begins with a list of ten general rules to remember. It then describes the construction of the boiler, and identification stampings and what they mean. After this, it tells how to wash the boiler, put it in service, and handle it in service.

It discusses water level, low water, foaming and priming, scale, oil, corrosion, leaks, water treatment, blowing

down, and repairs. Under the heading "Hand Firing" are listed several alternative methods of firing; sketches show the burning action of the coals; and three of the main causes for failure of grate bars in service are listed. The booklet concludes with details on how to treat boilers which are out of serv-

ice to prevent corrosion and deterioration.

Copies of this literature may be obtained from the company, or use the enclosed Request Card. Circle No. 71.

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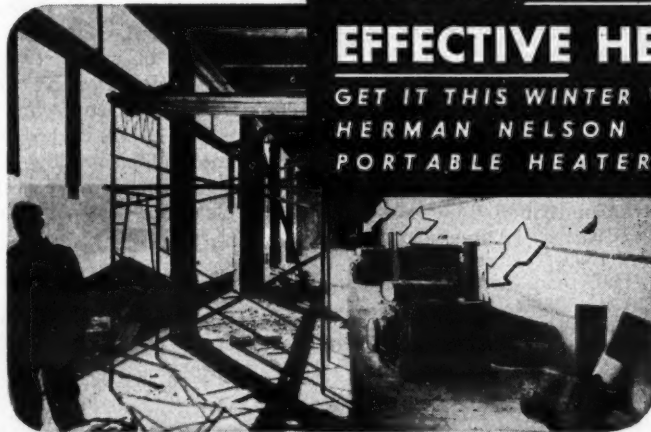


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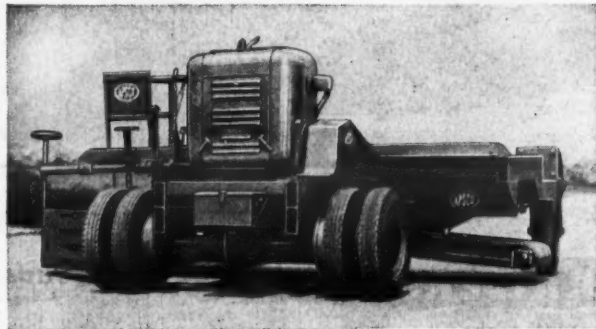
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† ALL the aggregate, both coarse and fine for Center Hill Dam, Tenn., (see page 44) is being produced by the Ralph E. Mills Co. of Roanoke, Va., and Gorman Bros. of Flemingsburg, Ky., under a subcontract. Rock is taken from a limestone quarry on the left bank of Caney Fork River, only 1,500 feet below the axis of the dam. The crushing and screening plant lies between the quarry and dam. It produces 250 tons of material per hour, including 80 tons of sand.

Made from stone, the sand is a blend of different gradations of fines which are obtained in the processing. The four sizes of coarse aggregate and the sand are stockpiled, and transported as needed to the concrete batch and mixing plant on a conveyor belt. The belt runs through a tunnel under the stockpiles, picking up a load of material, and then climbs to the top of the batch tower and unloads into the aggregate bins.

Limestone Quarry

The quarry has a nearly straight face, 1,000 feet long with an average height of 175 feet; the upper end is only 600 feet from the primary crusher. Vertical blast holes are drilled from the top of the quarry by two tractor-mounted Keystone Model 51 drilling machines powered by Buda engines. The holes are 6 inches in diameter. For best results, they are drilled to over 200 feet in depth to a level below the quarry floor. They are located 25 feet back from the quarry face and on 25-foot centers. From 7 to 8 holes are shot at a time, with a blast taking place about every three weeks since it takes that time for drilling.

When new, the bits are 6 feet long. They are secured to a 28-foot stem suspended from a steel cable which passes over the 30-foot mast of the drill rig. After they have been drilled for an average of 3 feet, the holes must be bailed out. The bits are usually re-sharpened after drilling from 20 to 25 feet, depending of course on the character of the rock encountered. A maintenance shop is located high up in the quarry where the dull bits are first heated in an oil furnace, and then sharpened on a Bucyrus-Armstrong bit dresser.

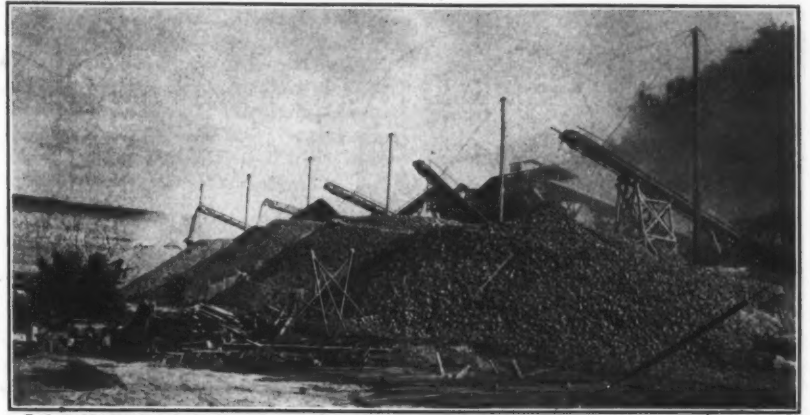
Each hole is charged with a ton of Atlas dynamite, on the average, packaged in 5-inch-diameter cartridges, 60 per cent strength on the bottom and 40 per cent on the top. Primacord is attached to the bottom cartridge. The blast is usually set off at the afternoon change of shifts on the dam, when the day workers have left and before the late crew comes on.

One day some of the day crew lingered in the prime contractor's work area to watch the shot. For some unforeseen reason—a rock fault may be the answer—the charge blew out through the face of the quarry. Large chunks of stone hurtled through the air, traveling over 2,000 feet across the river to the right bank abutment. Automobiles were battered. One man lost a leg and another suffered a severe eye injury. Ordinarily flying rock had been nil, with the dislodged portion of face crumbling slowly to the quarry floor as the direction of the blast was primarily upward.

Extra precautions have been taken to guard against unpredictable faults in the rock. The cartridges are left

intact; to keep the powder from running out into possible fissures, the contractor does not allow any splitting. The holes are stemmed with sand which fills all surrounding cracks and crevices tending to weaken the internal structure of the face rock. Workers are also barred from all exposed observation vantage points, however remote they may be from the place where the shot is being made.

Very little secondary blasting is necessary in the quarry, and the average charge produces 3.2 tons of rock to one pound of dynamite. The broken rock is picked up by a Koehring 2-yard shovel and loaded into six Koehring 6-yard Dumpsters which haul the material an average 600 feet to the surge bin of the aggregate plant.



C. & E. M. Photo

Five conveyor belts empty into five stockpiles at the crushing and screening plant Ralph E. Mills Co. and Gorman Bros. set up to supply concrete aggregate for Center Hill Dam. The plant is producing 250 tons an hour, including 80 tons of sand.

Stone Processing

At the bottom of the bin a Telsmith 48-inch x 15-foot apron feeder with a 48-inch opening moves the big chunks of rock along to a Farrel 42 x 40

primary jaw crusher. This breaks up the rock to an 8-inch maximum size. The 8-inch-down material is then moved via conveyor belt to a primary (Continued on next page)

American Road Builders' Association

announces

TWO IMPORTANT MEETINGS IN 1948

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1948 ROAD SHOW

SOLDIER FIELD

and

45th Annual ARBA Convention

JULY 16-24

CHICAGO

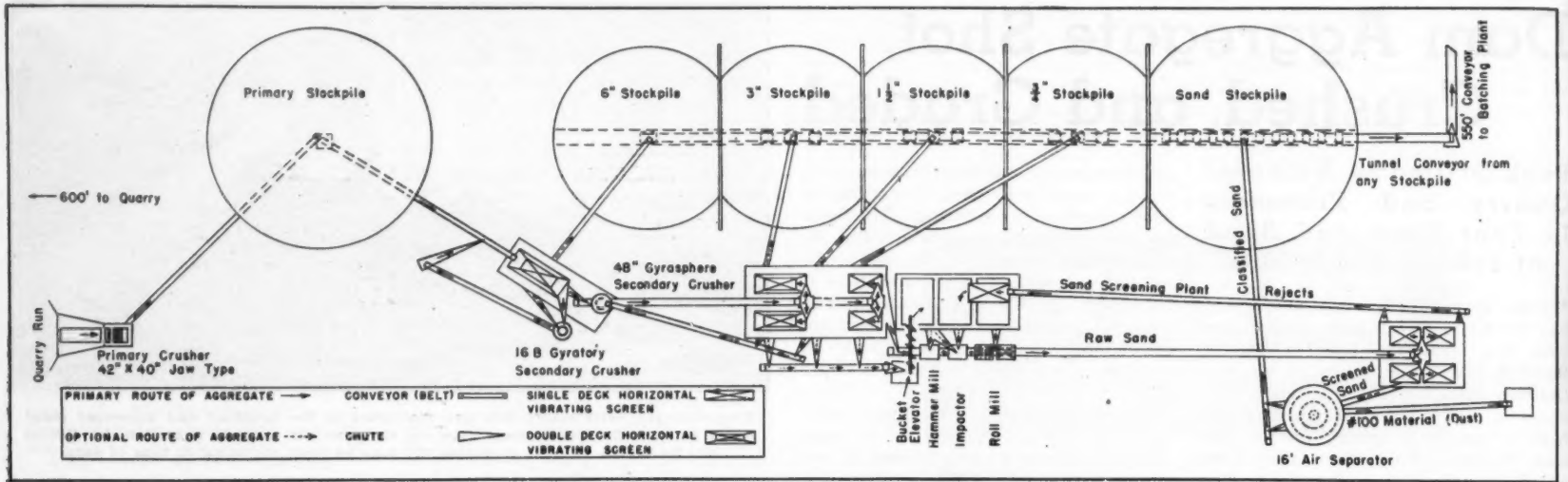
The 1948 ROAD SHOW will be the largest exposition of equipment, machinery and materials used in the construction of highways and airports ever staged . . . for the first time, heavy machinery exhibited AND OPERATED out of doors in an area of over 1,200,000 square feet. 100,000 people will see it.

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AMERICAN ROAD BUILDERS' ASSOCIATION

International Building

Washington 4, D. C.



Layout of aggregate plant used by subcontractor Ralph E. Mills and Gorman Bros.

Dam Aggregate Shot, Crushed, and Graded

(Continued from preceding page)

stockpile. From the bottom center of this pile the large-size stone is moved by feeder and conveyor through a concrete tunnel to the 6-inch screening plant and secondary crusher.

There it first passes over Robins 5 x 14-foot Gyrex-type double-deck scalping screens—6½ inches on top and 3½ inches on bottom. The oversize goes to a Telsmith 16B gyratory secondary crusher, and is then returned to the top deck of the scalping screens. The stone that is collected on the bottom 3½-inch deck, having passed the upper deck, drops into the 6-inch surge bin. It is then moved over a conveyor to the 6-inch stockpile. This 6-inch plant also has a Telsmith Gyrasphere crusher with a 1-inch minimum opening. If necessary, it can produce additional 1½ or ¾-inch stone from the 3 or 1½-inch aggregate, that could be returned from the 3, 1½ and ¾-inch screening plant which is next in line in the order of processing.

All the stone that passes the 3½-inch lower deck in the 6-inch screening plant is conveyed to the 3, 1½, and ¾-inch screening plant. There it is distributed over two Telsmith 4 x 12-foot Pulsator double-deck screens, 1¾ inches on top and ¾ inch on the bottom. The stone retained on the upper deck flows into a 3-inch surge bin and then over a conveyor to the 3-inch stockpile.

That retained on the lower deck drops into the 1½-inch bin and passes from there, via conveyor, to the 1½-inch stockpile. The various stockpiles are in adjoining rows.

Material passing the lower ¾-inch screen is then moved over two Telsmith 4 x 10-foot single-deck Pulsator screens having either ¾ or ½-inch openings. In dry weather the smaller size is used, but when heavy rains soak the stone the ½-inch screens are installed. However, these may be shifted about to produce any desired gradation combination. The stone retained on the lower screens drops into the ¾-inch surge bin, and then moves over a conveyor to the ¾-inch stockpile. The four different sizes of coarse aggregate for the concrete have now been processed and neatly stockpiled.

Sand Manufacture

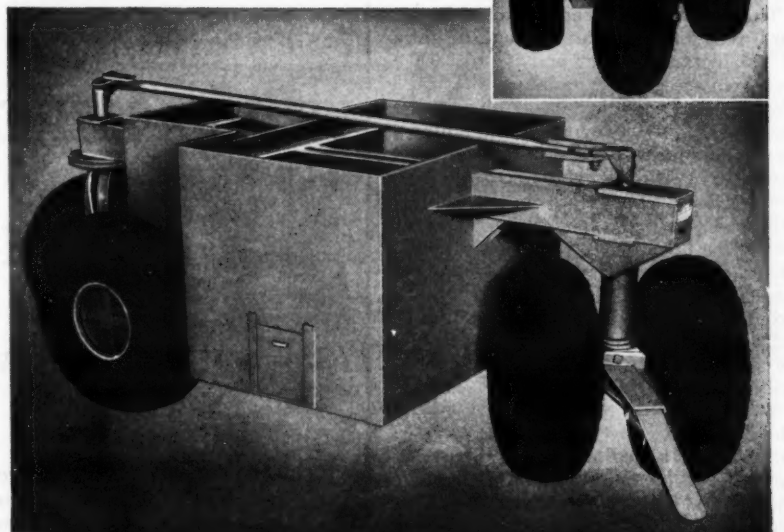
All the material that passes the last two screens in the coarse-aggregate plant goes over a raw-sand conveyor to the sand-screening plant. A 4-way hopper distributes the fine stone over four Tyler hammer-type 4 x 10-foot single-deck screens with openings varying between 3/16 and 1/16 inch. Rejects from the sand-screening plant double back over another long conveyor to the sand-manufacturing plant. There they pass over a Tyler hammer-type 4 x 10-foot single-deck screen with 5/16-inch openings.

Oversize rejects from this screen drop into a plus-5/16-inch surge tank that feeds the material to a Pennsylvania

54-inch reversible impactor directly below. It manufactures medium-size sand. The material passing the screen falls into a minus-5/16-inch surge bin, and

then into a Diamond 40 x 22 roll mill for the manufacture of fine sand. Sand production can be increased by taking (Concluded on next page)

"Cemco" Rolls out the IMPOSSIBLE Places



AIRPLANE-TIRED ROAD ROLLER

- Smooths as it packs
- Operates up to 15 m. p. h.
- Accurate weight calculation
- Turns at sharp angles

One highway engineer wrote: "The Cemco Flat-Iron Roller does a good job in places that would have been impossible with any other type of roller that I have seen." This pneumatic tired roller will smooth as well as compact stabilized bases, bituminous "cold lay" surfaces and seal coat aggregates. Water won't work into the soil when the Cemco Roller follows up the blading operation to seal the dirt fills.

It will carry a terrific weight load—128 cu. ft. of sand. This gives you a 10 ton roller when fully loaded. The low center of gravity permits work on shoulders and otherwise inaccessible places. 72" to 75" compaction path.

Roller bearing equipped, you can tow it to and from the job at 50 mph. Can even be used as a snow packer, trailer and emergency sprinkler.

See Your Dealer or Write for Literature

SECTIONAL CONVEYOR

Either portable or stationary, Cemco Conveyors are in two sections. Additional sections may be added for any desired length. 18"-24"-30" widths, with or without power. Hydraulic lift . . . self cleaning tail pulley . . . sealed bearings . . . extra heavy troughing rolls.



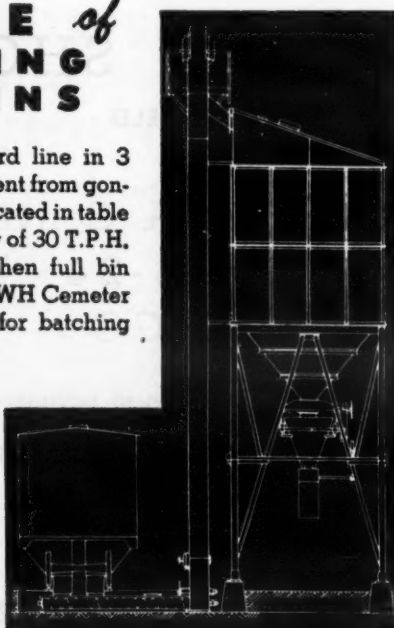
CONSTRUCTION EQUIPMENT and MANUFACTURING CO.
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ALSO MANUFACTURERS OF CEMCO HEAVY DUTY AGGREGATE BINS

A NEW LINE of CAR LOADING CEMENT BINS

WE have developed this standard line in 3 popular sizes for hauling bulk cement from gondola cars to bin. Capacities are indicated in table below. Bucket elevator has capacity of 30 T.P.H. High level bin signal indicates when full bin capacity has been reached. Type DWH Cemeter provides 8 to 20 cu. ft. capacity for batching service. Write for complete data.

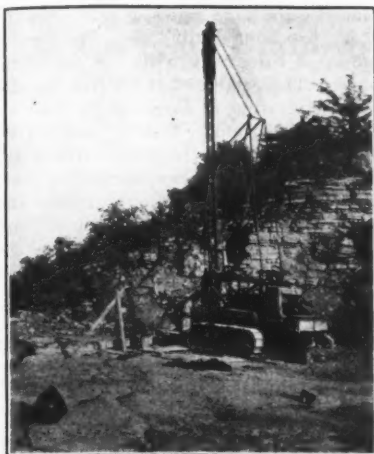
BIN	CAPACITY	
	CU. YDS.	BBLs
1	29	172 to 194
2	45	270 to 304
3	73	437 to 492



ERIE AGGREGATE PLANTS

Erie Steel Construction Co., 281 Geist Rd., Erie, Pa.

BUCKETS • AGGREGATE PLANTS • PORTABLE CONCRETE PLANTS



C. & E. M. Photo
In the quarry which supplied rock for Center Hill Dam aggregate, a tractor-mounted Keystone Model 51 drilling machine drills a 6-inch hole to a depth of 202 feet. In the left foreground is a light reflector for night drilling.

additional material out of the 3, 1½, or ¾-inch surge bins in the coarse-aggregate screening plant. The stone falls from the hopper bottoms onto a conveyor which drops it at the foot of a Telsmith bucket elevator. It is raised to a plus-3/16-inch surge bin whence it may be fed either to the impactor or to a Pennsylvania 54-inch reversible hammermill.

The screened and processed sand then enters a classifier plant located between the manufacturing and screening plants. The classifier plant contains a Sturtevant 16-foot centrifugal air separator which removes the great excess of fines that have resulted as a by-product of the manufacturing process. This lime dust is carried off on a conveyor to a waste bin. Sieve analyses show that 99 per cent of the waste passes the No. 100 screen and 96 per cent passes the No. 200 screen. The classified sand moves over a conveyor to the sand stockpile, the last in the row of stored aggregates. By changing the screens or adjusting the feeder controls, the amount of material entering the hammermill, impactor, or roll mill is easily varied to meet different conditions required in the production of the aggregate. All 16 of the conveyor belts used in the plant are Barber-Greene.

To the Batch Plant

The stockpiles are built up over a timber tunnel through which passes a

36-inch conveyor belt. Manually operated gates in the tunnel roof are opened under the individual stockpile at a signal from the batch tower, permitting the aggregate, one grade at a time, to drop onto the belt. When the conveyor leaves the tunnel it makes a right-angle turn and climbs a 550-foot incline to the top of the batching plant. Individual bins receive the aggregate and feed it to the weigh batchers below when concrete is being mixed.

Wallace E. Edwards is Plant Superintendent for Ralph E. Mills Co. and Gorman Bros.

Hydraulic Gear Pump

Two new hydraulic gear pumps, Models No. 9000 and 9075, are announced by The Aro Equipment Corp., Bryan, Ohio. They are designed for continuous service at pressures up to 1,000 psi, and for intermittent service at pressures up to 1,500 psi. Model No. 9000 is rated at a maximum capacity of 8-gpm displacement at 1,800 rpm; Mod-

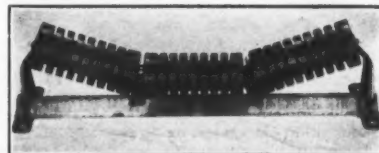
el No. 9075, 15-gpm displacement at 1,200 rpm. The pumped fluid may be any oil with a lubricating quality.

These pumps are recommended by their manufacturer for use with earth-moving and materials-handling equipment, such as bulldozer-blade controls, road-machinery controls, presses, and other units. The Aro line also includes the Model 9025 rated at a 5½-gpm displacement at 2,800 rpm. The pumps have a new line of 2-way, 3-way, and 4-way valves. Included are models which have integral relief valves to control the system pressures, and a neutral position to unload the pump between operating cycles.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 49.

Rubber-Ring Idlers

An impact-cushioning idler for use with belt conveyors has been developed by the Goodyear Tire & Rubber Co., Akron, Ohio. These idlers are said to be



This new type of impact-cushioning idler for belt conveyors was developed by Goodyear Tire & Rubber Co. The rubber rings are mounted on the idler core for maximum deflection.

able to withstand and absorb the shock of falling material, and to permit maximum deflection. It is further claimed that they will help solve the impact problem by decelerating lumps in the material being carried on the belt which the idlers support.

This new style of idler consists of a series of rubber rings mounted on the idler core. Its use increases and in some cases doubles the life of a belt, the company says.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 43.



**HOW TO DIG A DITCH -
AND NOT GO IN THE HOLE**



Yager and Sons, Beaverton, Michigan, call the 3-cylinder GM Series 71 Diesel that powers this shovel "just about the best power we've ever used." Inset shows Mr. Fay Yager, in charge of the shovel operation, who says, "You fellows just don't boast enough about that GM Diesel engine."

Shown here is a General Motors Diesel-powered Bay City ¾ yard shovel. It's doing the toughest part of a pipe-trench job—mile after mile of 6' by 12' trench—cutting through wet sand, swamp mud, pulling stumps, digging in the roughest kind of terrain.

Taking jobs like this in stride is everyday work for GM Diesel-powered equipment. The 2-cycle

GM Diesel gives instant response to widely fluctuating power demands, operates on low-cost fuel, and delivers long, economical service.

No wonder so many operators rely on GM Diesel power to help them trim costs on close-figured contracts. You, too, will find it pays to specify GM Diesels for repowering old equipment or when buying new. Write today for complete details.

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MULTIPLE UNITS... Up to 800 H.P.
GENERAL MOTORS

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Always Guard

Order through Your Jobber
EMBURY MFG. CO., WARSAW, N. Y.



One man can raise or lower the platform of this tilting-top trailer, according to the manufacturer.

Tilting-Top Trailers

Two new tilting-platform trailers have been announced by the C. R. Jahn Co., 1106 E. 35th St., Chicago, Ill. The larger model, the JT-408, has a rated capacity of 8 tons, and carries the entire load on a tandem axle with four wheels and tires. The smaller Model, JT-205, has a single axle and a rated capacity of 5 tons.

The trailer is balanced to permit one man to raise or to lower the platform. No jacks or loading ramps are required. The entire load can be carried on the trailer, but it is said that the platform is so designed that the load may be shifted to transfer any weight to the rear of the truck if greater traction is desired. A positive safety lock is installed to hold the platform in position when loaded or empty. The rubber-mounted drawbar is said to absorb road shocks in order to protect both truck and trailer.

Standard equipment includes lash rings, stake pockets, safety chains, reflectors, drawbar support, and an adjustable drawbar ring. Platform guide plates aid in loading, and in protecting the tires. Power brakes and electric lights are available at additional cost.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 36.

Tractor-Mounted Cranes

Cranes mounted on J. I. Case industrial tractors are the subject of a catalog now being distributed by the Mercer Engineering Works, Inc., 30 Church St., New York 7, N. Y. The Type B cranes are made in three models with a single or double-drum attachment for use with a dead or live boom.

One page of Bulletin No. 80 is devoted to the Model 3, with a 3-ton capacity; another to the Model 5, with a 5-ton capacity; and a third to the Model 7 with a 7-ton capacity. The bulletin shows pictures of the units and lists in a single table the specifications, dimensions, and other data for all models.

The catalog also devotes a page to the various booms available for use with the Mercer cranes. Those illustrated are the straight live boom; the straight fixed boom; the special straight live boom with the gooseneck head; straight fixed boom with gooseneck head; straight live boom with a telescoping gooseneck head fitted with two sheaves and two boom rollers; and the straight fixed boom with a telescoping gooseneck head fitted with two boom rollers.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 88

WON'T QUIT or cause time out



A Haywood Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Haywood Company

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Haywood Buckets

Scale-Model Studies Pay Large Dividends

How engineers are making models of tidal rivers and harbors pay dividends through reduced dredging maintenance costs was discussed at the Fall Meeting of the American Society of Civil Engineers held in Jacksonville, Fla. Henry B. Simmons, engineer at the Corps of Engineers' Waterways Experiment Station, Vicksburg, Miss., reported on the successful use of models in which hydrographic and topographic conditions, tidal heights, current velocities, and salinity are reproduced. He cited one instance where shoaling was cut virtually in half at an annual saving of \$67,000, through the use of these models.

Reproduction of tidal phenomena requires that the models be constructed exactly to scale ratios, Mr. Simmons explained. This makes it necessary to acquire accurate prototype surveys for the construction of the models. Accurate reproduction of the rise and fall of the tide in the model and of the resulting flood and ebb tidal currents is controlled by electrical timing devices.

The models are built to a scale of 1 to 1,000 horizontally and 1 to 150 vertically. Roughness simulating the riverbed is produced in them by using stucco and small gravel arranged so that current velocities and distribution of flow conform to the prototype equivalents.

One of the model studies discussed by Mr. Simmons was that of Deepwater Point Range in the Delaware River. "At the time of the model study," he said, "the range shoaled at an average rate of approximately 2,800,000 cubic yards annually, requiring almost continuous dredging to maintain project depth. The heavy shoaling was due, according to extensive studies, to lack of parallelism between the currents and the channel." Through a study conducted on the model, it was recommended that a dike be constructed to realign the currents, and that a reduction in shoaling of 47 per cent was attainable. A study of 3½ years immediately following the construction of the dike showed a reduction in shoaling of 48 per cent from the average rate before its construction.

Emphasizing that the hydraulic model is not a cure-all for tidal river and harbor problems, Mr. Simmons pointed out that it does provide a means for comparing the various types of im-

provement works. In many instances, it reveals undesirable hydraulic characteristics of a proposed improvement plan that could not be detected by other means. And it often reveals that even if extensive construction is undertaken, it will not provide the desired results.

Hydraulic Power Unit

A compact, portable hydraulic power unit capable of supplying 3 gallons per minute at 1,000 psi is announced by Hydro-Power, Inc., Belmont and Sheridan Aves., Springfield, Ohio. It is recommended by the company for use with equipment such as hydraulic wheel pullers, shaft extractors, portable elevators, arbor presses, broaching tools, pipe benders, remote-control lifting jacks, vise and clamping tools, etc.

The Paul Bunyan, Jr. includes in one unit a 17-gallon storage tank with foot mountings, an electric motor, V-belt-connected gear pump, and a 4-way operating valve. Standard power unit is a 1½-hp 1,800-rpm 220 or 440-volt motor. The unit can be supplied with a 2½-hp 1,200-rpm air-cooled gasoline engine. It is 16½ inches wide x 28 inches long x 29 inches high, and weighs 290 pounds when supplied with operating oil. It can be mounted on casters or

placed on a hand truck.

A precision-built gear pump is mounted integrally with the operating valve. This valve has a ball-handle lever operating at forward, neutral, or reverse positions. Check and relief valves are built in the main valve body; hence only the two operating-line connections need be made to ready the unit for service. Permanent suction and return lines are installed between the pump and tank. The tank is supplied with an oil-level gage and an air-filtered breather cap.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 48.

Vulcan Tools

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

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Here's the new CON-VAY-IT Concrete Special!

It's unsurpassed in its ability to speed up the movement of wet concrete from mixer to forms. With CON-VAY-IT Special you'll pour concrete faster, and at but a fraction of your normal labor cost. Available with either gas engine or electric motor drive.

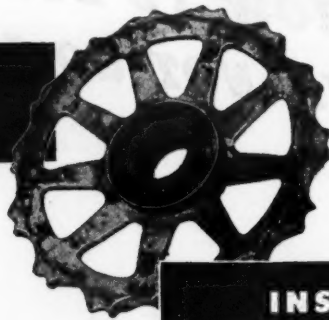


Construction men in all parts of the country are using this highly efficient Concrete Conveyor with great success... and claim it has saved them many thousands of dollars annually. You should know about CON-VAY-IT Special — write for details TODAY.

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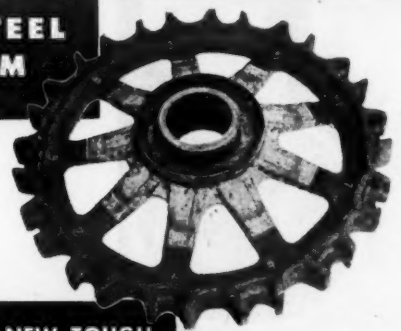
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MANGANESE STEEL
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PROMPT DELIVERY FROM STOCK

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AND HAVE A NEW, TOUGH,
WEAR-RESISTANT MANGANESE STEEL DRIVE SPROCKET LIKE THIS.



Paver Crowds Crew On Concrete Highway

(Continued from page 1)

8 inches in 3 feet, and maintaining that thickness to the center line.

The slab is reinforced by four continuous $\frac{5}{8}$ -inch round steel bars. Two of these bars, 24 inches apart, run 12 inches on either side of the center line under the center-joint strip. The other two longitudinal bars each run along the outside edge 9 inches from the form line.

Transverse round $\frac{1}{2}$ -inch steel bars reinforce the slab on 48-inch staggered centers. These bars extend from a tie-in point with the outer longitudinal bars to a point 15 inches on the opposite side of the center line. The center part of this steel mat is all supported at the steel intersections by steel chairs driven into the soil subgrade.

No sand or rock sub-base was placed under the new pavement; however, a layer of asphalt-impregnated paper separates the concrete from the graded earth below the slab.

Pouring Sequence Good

Atkinson's General Superintendent, C. K. Moose, had to figure out the most efficient pouring sequence to make the job roll as rapidly as possible. With the batch plant on the main Rock Island Railroad line in Chariton, he had a 1.1-mile dead haul to the start of the job. If he started from the south end, his batch trucks would have about 9 miles of haul road, mostly dirt, on which to travel.

Moose therefore picked a spot about halfway in the 7.774-mile project, and started paving at that point. The machines were set up to work north, towards Chariton. Thus when this first leg was finished, batch trucks had a concrete slab on which to travel as they hauled the material out for the other part of the job. This scheme was also most desirable in view of an uncompleted bridge near the south end of the job. While Moose was working north from the middle of the highway job, the bridge contractor had time to complete his work. It was then possible for Moose to move his equipment to the south end and work north towards the point at which he had started.

As an example of the speed at which the Atkinson job moved, paving equip-



C. & E. M. Photo

At Atkinson's batch plant for the Chariton job, a Bucyrus-Erie 45-B crane feeds a Johnson 76-cubic-yard batcher with aggregate and sand clammed out of railroad cars and stockpiled. In the background is the Johnson cement silo.

ment finished the first half of the slab on a Wednesday afternoon. On Thursday the crews loaded all equipment and started it back to the far end of the job. By Friday afternoon the outfit was in operation again. Elapsed time: about $1\frac{1}{2}$ days.

Subgrade Dressed Mechanically

Grading on the Atkinson job had previously been finished under another State Highway Commission contract with Central Construction Co. of Indianola. This well known outfit left the earth work close to grade. In general, the embankment was slightly high.

Surveyor's stakes, offset 4 feet, marked the proper alignment of the outside of the slab. A string line was established along the form line on steel pins, and a Cleveland Formgrader then excavated a shallow trench in the soil to hold the 10 x 10-inch concrete forms. After this trench was dug, it was smoothed up just ahead of the forms by two men from the form crew.

About 2,300 road-feet of Blaw-Knox 10 x 10-inch steel forms were used to contain the concrete slab. These forms were set from 700 to 800 feet ahead of the paver at all times. In the form crew were 8 men who hauled, unloaded, and stripped the 10-foot sections. Two men set the sections in place, two men staked the pins in the ground, and two men kept the string line established to mark line and elevation for the Blaw-Knox forms.

When the forms were set ahead, a Flynn Surgrader moved up to skin the subgrade off to proper depth. The ex-

cess material cut by this machine was dumped by the bucket chain outside the form line. After the machine passed by, the ridge of dirt was flattened by a Caterpillar No. 12 motor grader, which was used on much of the preliminary work.

Measurements taken by state inspectors from a string line, stretched taut over the form tops, were used to check the proper depth of grade. Alignment of the forms was also rechecked after the Flynn machine passed by. The steel forms were oiled just behind the Surgrader.

The Flynn machine tried to cut the subgrade to exact elevation. The soil was so well compacted from the initial grading operations that it was not necessary to leave it high. After the machine passed over, the grade was sealed smooth by rolling it several times with a Buffalo-Springfield 3-wheel steel roller.

Joints

Little preparation had to be made throughout the job for expansion or contraction joints. The slab has contraction joints only at the bottom of several steep hills, and expansion joints only at several bridges and other fixed points along the line. Expansion joints were made up with 1-inch asphalt mastic expansion-joint material and 1-inch capped steel dowel bars on 15-inch centers. Fastened together in a frame, they were set in place at the few locations specified.

A weakened-plane joint, laid longitudinally along the pavement center line, was formed in the paving-machine line-up by a strip of $\frac{1}{8}$ x 3-inch mastic, laid by a Cleft-Plane flexible-joint installer.

Batch-Plant Set-Up

All concrete materials had to be hauled in by railroad to Chariton, so the cement and aggregate-batching bins were set up in town on the Rock Island railroad. Sand and one size of rock aggregate were shipped in from the Des Moines Concrete Materials Co. at Des Moines, Iowa. Universal bulk cement was shipped in from the Universal plant at Hannibal, Mo.

Aggregate and sand were clammed out of the cars by a Bucyrus-Erie 45-B crane, equipped with a 55-foot boom and a 2-yard Blaw-Knox clamshell bucket. These materials were stockpiled in reach of the crane as cars came in, and later transferred to the double bins of a Johnson 76-cubic-yard weigh batch plant, set up a few feet away from the tracks.

The bulk-cement unloading was one of the worst headaches of the job. The railroad had pressed into service a

(Continued on next page)

NO
COMPRESSOR
HOSE
BATTERY BOX
CABLE
SPRINGS
That's SYNTRON



100% Self-Contained
GASOLINE HAMMER

PAVING BREAKERS

The explosive energy of gasoline—producing 2,000 heavy, powerful blows per minute—make short work of busting concrete—digging frozen ground, clay and shale—cutting asphalt, and tamping backfill.

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SYNTRON CO.

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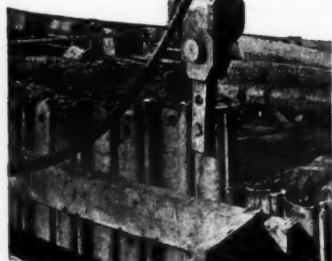
DOUBLE-ACTING PILE EXTRACTORS with unusual pulling power

These rugged extractors connect with piles quickly, loosen them speedily, remove them efficiently, place them just where desired—then disconnect easily. Mechanical principles similar to those embodied in McKiernan-Terry Double-Acting Pile Hammers make the operation of McKiernan-Terry Pile Extractors extremely effective and economical for any pile-extracting job. Two standard models—heavy-duty and extra heavy-duty.

ME-1007

SEND FOR BULLETIN NO. 55

for full information, specifications, etc. on McKiernan-Terry Double-Acting Pile Hammers and Extractors.



McKIERNAN-TERRY CORP.

Manufacturing Engineers

19 PARK ROW, NEW YORK 7, N. Y.



Paver Crowds Crew On Concrete Highway

(Continued from preceding page)

number of hopper-bottom converted coal cars. The slope of the bed in these cars was hardly enough to let the cement dump clean. Where one or two laborers ordinarily take care of cement handling, this job required from four to six. Experiments were made with vibrators, with air jets and shakers. About the only way to get the stubborn cement out was to gouge about half of it loose with shovels and hoes. Once the cement entered the feeder hopper in the railroad tracks it was conveyed rapidly to a C. S. Johnson 100-barrel cement silo.

The batch plant was so set up that a 2-batch truck could back under the Johnson sand and rock bins, drive through under the cement scales to get that material, and then pass by a platform where a laborer was stationed to close the hinged lids on the truck bed. At the sand weigher, sand and rock both entered the compartment at once. Two weighings were necessary to fill each truck. With the job rolling at high speed, material was weighed and turned out of this plant at a peak rate of 42 truckloads an hour, or 84 batches weighing about 420 tons.

The dry batches were weighed out according to the following formula:

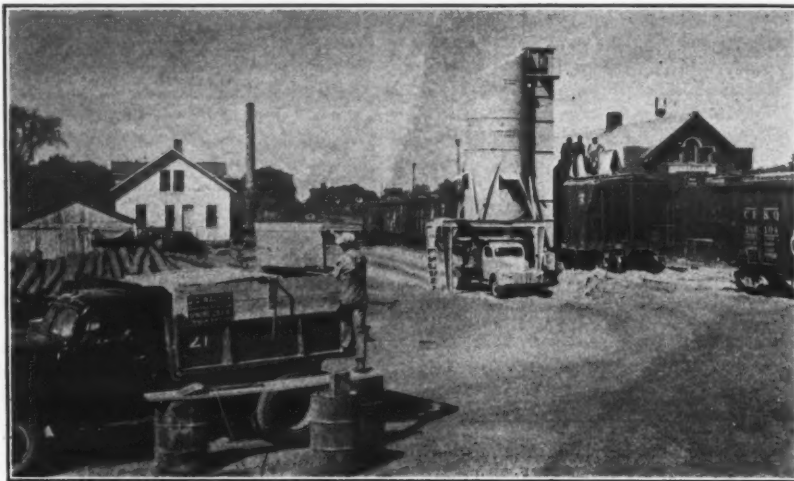
Rock, 1 1/4-inch-maximum	2,251 lbs.
Sand	1,821 lbs.
Cement	758 lbs.
Water-cement ratio—5.25 gals. per sack	

Batch trucks were rented on a batch-mile basis. At peak operations, 20 machines were used on the long haul; this number decreased as the haul distance shortened. Most of these trucks were Fords and Chevrolets and each one carried two 34-cubic-foot batches.

Concrete Mixed Fast

Batch trucks came in over the subgrade, passing over the grade between the forms through two form sections left out at short intervals ahead of the paver. They turned around under their own power, backed in to the paver, and dumped their batches as directed.

The key machine on the Atkinson job was a huge Koehring 34-E Twinbatch paver, capable of spewing forth a 34-cubic-foot batch of mixed concrete every 42 seconds. State inspectors have a unique "penalty" ruling that if



C. & E. M. Photo

At left a laborer closes the hinged lids on a truck bed filled with two dry batches of material for the Atkinson concrete-paving project. In the background, the Johnson cement silo takes on bulk cement from railroad cars.

a paver operator ever gets a double batch in a drum, inadvertently or other-

wise, the material must be mixed 7 minutes. Fortunately this does not

often happen, for the result is a rubbery mess.

The Twinbatch paver, equipped with a 35-foot boom and a dual-gate bucket, set a murderous pace. Many of Atkinson's men were local farmers, resting between harvested or burnt-up crops. They said they never worked so hard on their farms as they did keeping up with this machine.

Mixing water came in from the Charleston city supply. A standpipe was rigged at a fire hydrant at the south city limit, and three 1,000-gallon tank trucks hauled the water out to the paver. The water was transferred through 50 feet of flexible rubber hose. Only 60 seconds in the paver resulted in a well mixed, workable concrete with a slump of about 2 inches. Beams made from this material showed an average of 700 pounds of flexural strength after 14 days.

Placing and Spreading

Mixed batches were dumped on the (Concluded on next page)

1.



2.



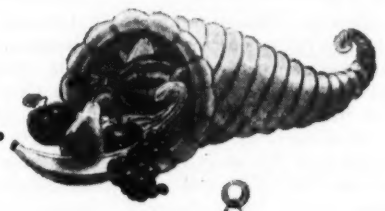
3.



4.



1.



2.



3.



4.



Match up the people and the horns

(It may mean money to you!)

The first three, of course, are very easy.

The sea captain (1) goes with Cape Horn (3); the musician (2) with the French horn (4); and the pioneer (3) with the powder horn (2).

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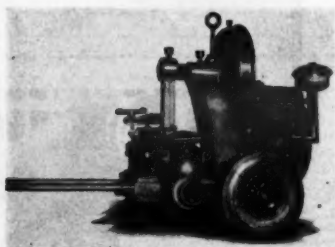
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Write for Bulletin 4503

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subgrade just ahead of a Jaeger concrete spreader. A crew of men kept the steel reinforcing and the asphalt-paper cushion laid right up to the paver at all times, so the concrete could be placed as rapidly as the machine mixed it. The paper was rolled out longitudinally, six rolls covering the 22-foot width between forms.

At the front end of the Jaeger spreader two steel arms were welded, with steel wheels on the lower end. These wheels rode along underneath the longitudinal steel and kept it up in the center of the slab when batches of fresh concrete dumped down on the mat.

Two Jackson hand vibrators were also carried on the rear of the Jaeger spreader. These units were used only around the end-of-day header, expansion joints, or special areas. The Jaeger spreader distributed concrete evenly over the mat between the steel forms, and rolled excess material on ahead by means of its worm-gear spreader mechanism.

Next in the machine line-up was a Jaeger-Lakewood horizontal double-screed finisher. On the front of this machine a Jackson tube vibrator was mounted, to consolidate the concrete throughout the slab. This machine put the first finish on the freshly laid concrete. A laborer at each side of this machine kept the sides puddled, and occasionally threw in a shovel or two of concrete as required.

A Cleft-Plane joint installer was the next machine to work on the slab. Under its own power, this machine knifed a 3½-inch slot in the fresh concrete at the center line, and laid a thin ribbon of asphaltic material down the pavement. This material was placed flush with the surface of the slab, and the operator of the machine left a wood-troweled finish over the top.

After the joint installer had passed by, a Koehring Longitudinal Finisher put the final mechanical surface on the slab. Where the first finisher's screeds had moved across the concrete surface from form to form, the Koehring floats dressed the surface lengthwise. The net effect was a dense, accurate finish.

Hand Finishers Take Over

Hard-pressed to keep up with the fast-moving line of machines were four concrete finishers, whose job it was to dress the concrete slab with various tools. First they used long-handled steel and wood floats, which dressed the center of the pavement to final grade. When these floats had passed over the slab, it was as accurate as men and modern paving equipment could lay it down. Later on, other men dressed it still farther, as we shall see.

A double-belt finish was then pulled on the surface of the slab, and the concrete edges at the form lines were dressed with edging tools along any part free of the drain curbs.

Curb Work

On all low sides of pavement, where rain water might later fall and run, a 3-inch curb was built, featheredging in to nothing where it met the concrete slab. The outside of this curb was formed by 3-inch irons in 10-foot sections, clamped to the top of the Blaw-Knox steel forms.

Concrete for the curb was hauled by a huge Percheron horse named Joe, who dragged a small box along the ground on skids. Four men kept the box replenished at the paver dump, and shoveled in place at the curb forms. A finisher using a steel form the shape of the concrete curb put the final finish on this part of the concrete work. After the curb crew had finished with its work, the newly laid concrete slab was ready for the final work—curing and checking for rideability.

Elaborate Cure Used

The concrete was cured by wet bur-

lap for 5 hours until it had set up thoroughly. Often the wet burlap stayed on overnight. In any case, the concrete was not more than 12 hours old when the burlap was removed a few strips at a time and moved ahead.

As it was taken away, the surface was tested with a 10-foot straight-edge to see that no humps or pockets more than ⅛ inch in 10 feet remained in the slab. The straight-edge was used by running a 10-foot strip transversely, with the axis of the board parallel to the center line of the slab. If there were any high places, they were ground down at once with a Wisconsin-engine-driven Berg concrete grinder, using fine emery stone on the wheel. Grinding was done until the slab met all the specifications for smoothness.

After the surface was checked and dressed, two spray outfits applied Cecure concrete-curing compound, each man taking half the slab. The wet burlap was removed only about 30 feet ahead of the grinder and cure sprays. It was loaded to a flat-bed truck, and hauled ahead to the start of water curing from time to time.

Forms Stripped Later

Specifications required that the steel forms remain in place for at least 12 hours. This more or less automatically resolved itself into a situation where any forms filled with concrete on one day's pour would be stripped the next day. The pins were easily extracted from the clay subgrade by using small lever crowbars with pulling lugs. The forms were cleaned of any loose concrete with shovels, and moved ahead on a flat-bed Ford truck.

According to Superintendent Moose, the job had a most fortunate break on labor, because so many local farmers were unoccupied and quite willing to stick with him the 10-hour day shift he proposed to work. Most of the men were happy to have an actual part in the construction; most of them made good construction hands; and all were looking forward to the day when they could ride over the finished pavement and say to their friends, "I had a part in building this road".

Personnel

The job was designed and administered under the general supervision of Fred R. White, Iowa's Chief Engineer, with A. A. Baustian in charge as Construction Engineer. Resident Engineer

on the project was C. R. Bentz.

For the C. H. Atkinson Paving Co., C. K. Moose was General Superintendent, Willis Adams was Paving Superintendent, and O. C. Coleman was Concrete Foreman. Subgrade work was under the direction of J. L. McClintick.

Begun August 21, 1947, and scheduled for completion by October 15, the job saw average footages of 1,300 feet in 10 hours, with a peak day of 1,633 feet in 11 hours. That is good concrete-paving production in anybody's language.

Airport-Managers' Guide To Concrete Maintenance

A technical booklet on the maintenance of concrete runways, taxiways, and aprons has been prepared by W. R. Macatee, Manager, Airport Division, American Road Builders' Association. Written in an easy-to-understand manner, it is another in the series of maintenance booklets published by the Association for the aid of airport man-

agers.

This 30-page booklet covers all phases of the subject. It describes the properties of concrete pavements; it lists the factors governing the strength of concrete; it explains the stress-effect of temperature and moisture on concrete; and it also discusses the causes of voids in subgrades.

Mr. Macatee then goes into a discussion of joint spalling, surface damage to concrete pavements, and repair methods. Under repair methods he describes crack-sealing operations, equipment, and materials; he explains how to fill voids in subgrades; he describes the Mud-Jacking process in detail; he gives the procedure for replacing broken-slab areas using either concrete or bituminous patches. He also lists resurfacing methods.

Copies of Technical Bulletin No. 128, 1947, can be obtained by writing to the ARBA, Airport Division, 1319 F. St., No. W., Washington 4, D. C. Price of the book is 50 cents per copy.

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Blackhawk's new heavy-duty hydraulic jacks combine the load pump and speed pump into a single unit. The load pump cuts in automatically when the speed pump has raised the saddle to the load.

New Jack Combines Speed and Load Pump

Two new heavy-duty hydraulic jacks have been announced by the Blackhawk Mfg. Co., 5325 W. Rogers St., Milwaukee 1, Wis. The FB-11 is listed at 30 tons, and the GB-11 is rated at 50 tons. A feature claimed for these pumps is that they combine the load pump and speed pump into a single unit. They are designed so that the load pump will cut in automatically when the speed pump has raised the jack saddle to the load.

These new models have bases machined from steel blocks 2 3/4 inches thick in order to withstand severe stress. Among the features listed by the manufacturer for the new Blackhawk jacks are: a recessed safety-release valve; overall closed construction; ports for gage or valve installation; pump-beam protection; carrying handle; and on-the-side operation. Both units are one-man-operated.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 25.

Drill Cuts Concrete With Abrasive, Water

A portable abrasive core drill for cutting holes in concrete is made by Howe-Simpson, Inc., 136 E. Gay St., Columbus 15, Ohio. It grinds a hole by the use of silicon-carbide abrasive and water circulated by a revolving drill tube bit. The Model H-S 14 is supplied with thirteen standard drill sizes varying in diameter from 1 to 4 inches, in 1/4-inch steps. It will drill vertical holes up to 18 inches deep. Deeper drilling is possible with the use of extension shafts.

Some of the advantages claimed for the Howe-Simpson drills are that they will not spall the ceiling below as they penetrate a floor slab; will cut through steel reinforcing bars; worn steel bits are reslotted with a hacksaw or replaced by a new bit; the machines are semi-automatic, and one operator can handle several of them.

The H-S 14 is 5 feet 2 inches in overall height; 3 feet 1 inch long; and 18 inches wide. It is driven by a 1-hp 220 to 440-volt 3-phase 60-cycle, 1,750-rpm electric motor. Motors of other specifications are available on request. It has a V-belt drive over cone pulleys, with three speeds.

Further information may be secured from the company, or by using the enclosed Request Card. Circle No. 33.

Syntron Opens New Factory

The opening of a new plant at Blairsville, Pa., has been announced by the Syntron Co., Homer City, Pa. This plant will be used for the manufacture of the company's large heavy-duty vibratory feeders and conveying equipment.

Caterpillar Ups Jack Gill

The appointment of Jack H. Gill as Engine Sales Consultant has been announced by the Caterpillar Tractor Co., Peoria 8, Ill. In his new capacity, Mr.

Gill will advise, coordinate, and plan the development of engine sales with sales managers of the firm.

AED Set for Convention

Plans have been completed for the 29th annual meeting of the Associated Equipment Distributors to be held February 15-19, in Chicago. Advance reservations indicate that the number of member companies to be represented at this meeting may be larger than at any previous meeting.

Final plans for the meeting were made when the Convention Committee met in Chicago in December. The program will be confined largely to topics of interest common to manufacturers and distributors. Two and a half of the four meeting days have been set aside for discussions and talks on business problems. The remaining time has been left open to allow the various manufacturers to get together with their distributors for sales meetings and discussion groups.

CONTRACTORS & ENGINEERS MONTHLY

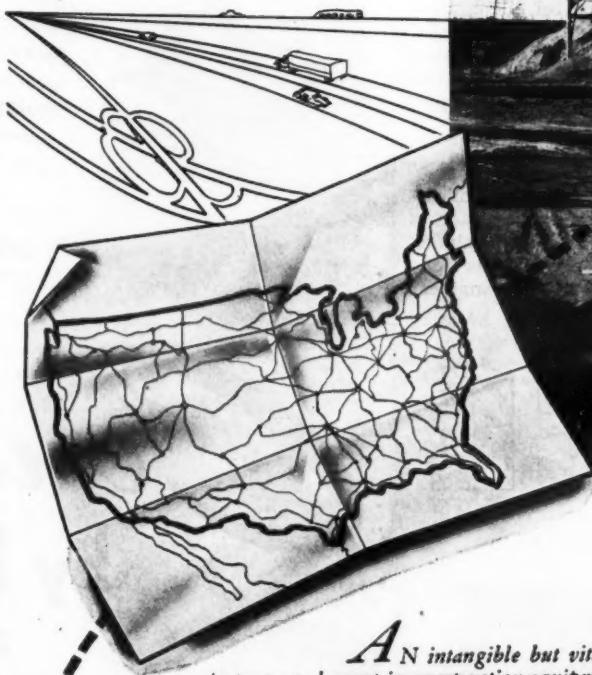
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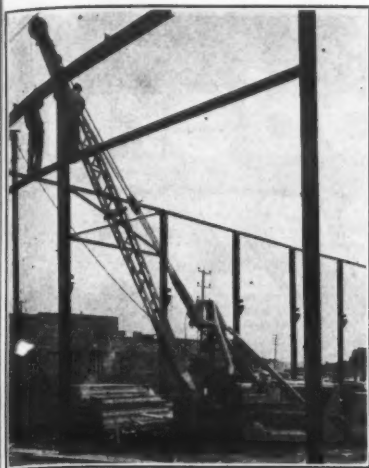


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A Hystaway on a Caterpillar D6 handles steel beams for the new building of the Union Tractor & Equipment Co. Ltd., of Calgary, Alberta, Canada.

Design of Pavement Using Triaxial Compression Test

The results of Kansas' use of the triaxial compression test in its design of flexible pavements have been published in pamphlet form by the Highway Research Board. Bulletin No. 8 presents information on this method of testing soils and related materials, and on the application of the test data to design.

Kansas reports that the progress and results obtained have been satisfactory. Therefore, this information is being made available to others interested in the general problem of design of flexible pavements and, more specifically, in the triaxial method of testing. This system for the design of flexible surfaces and bases in Kansas has been accepted by the Kansas Highway Commission and the Public Roads Administration.

Triaxial tests may be conducted upon each component of both the road surface and the foundation individually, and calculations made to determine the thickness of each material which is required over the subgrade. Bulletin No. 8 describes the equipment and procedure for preparation and testing which were used in Kansas. It defines the problem of flexible-pavement design and shows in detail how the triaxial test is used for the purpose of design. Sample calculations, derivations, and convenient tables and charts are included.

Copies of Bulletin No. 8 can be obtained from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. Price: 75 cents.

Diesel-Engine Folder

A folder describing its Model 6-WAKD diesel engine has been made available by the Waukesha Motor Co., Waukesha, Wis. The folder features a large cut-away drawing in which each of the engine parts is pointed out.

Five constructional features are described in detail—the combustion chamber, the oil-cooled piston, the connecting rod, the oil cooler, and the starting system. A graph is reproduced which shows the performance curve for the Model 6-WAKD as an industrial engine. There is a list of all the principal engine dimensions, and another one which describes the standard engine equipment. A schematic installation diagram completes Folder No. 1415.

Copies of this literature may be obtained from the company. Or use the enclosed Request Card. Circle No. 92.

Hoy Retires as Sales Mgr.

Randolph H. Hoy has retired from the Universal Atlas Cement Co. At the time of his retirement, Mr. Hoy was Sales Manager in the Pittsburgh territory. Appointed to succeed him is Fred L. Wagner, formerly the Assistant Sales Manager in that territory.

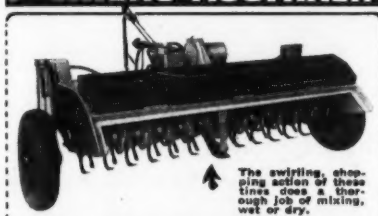
Traffic Lights Don't Meet All Intersection Problems

Traffic lights are not necessarily the answer to traffic problems at intersections. This viewpoint was expressed by Charles M. Ziegler, Commissioner, Michigan State Highway Department, in answer to the growing list of requests for lights which have been received recently at his office.

Scientific studies by traffic experts have shown that in many cases accidents have increased rather than decreased at intersections after traffic signals were installed. One study conducted by the National Safety Council at 354 intersections in 22 cities revealed an increase in accidents at 135 of these crossings; the increases ranged as high as 79 per cent. Head-on and rear-end crashes and collisions involving vehicles making turns were prominent in these increases.

Commissioner Ziegler explained that in Michigan every request for installation of a signal results in a thorough investigation of the area concerned. If it is shown there is a definite need for a signal and that it will improve conditions, it is installed. On the other hand, if it is shown that a signal may tend to congest traffic and encourage accidents, or that traffic volume is light and does not meet the standard warrants established for the installation of a signal, then requests are not approved.

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